REPORT RESUMES

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THE TITLE VII RESEARCH SEMINAR, APRIL 11-13, 1960, UNIVERSITY OF COLORADO.
BY- KIEFFER, ROBERT DE GOOD, LEROY V.
COLORADO UNIV., BOULDER
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IN NOVEMBER 1959, REPRESENTATIVES OF 12 STATES IN THE ROCKY MOUNTAIN PLAINS REGION ASSEMBLED IN BOULDER, COLORADO, TO PARTICIPATED IN A 3-DAY RESEARCH SEMINAR ON TITLE VII OF THE NATIONAL DEFENSE EDUCATION ACT. (TITLE VII COVERS RESEARCH AND EXPERIMENTAL ACTIVITIES FOR MORE EFFECTIVE UTILIZATION OF TELEVISION, RADIO, MOTION PICTURES, AND RELATED MEDIA FOR EDUCATIONAL PURPOSES.) DISCUSSIONS WERE CENTERED AROUND THREE MAJOR TOPICS--(1) CONDUCTING RESEARCH IN THE MASS MEDIA, (2) DISSEMINATING RESEARCH FINDINGS, AND (3) UTILIZING EFFECTIVE PRACTICES PROVEN BY RESEARCH. RESEARCH WAS CONSIDERED AT ALL EDUCATIONAL LEVELS FROM KINDERGARTEN THROUGH ADULT EDUCATION. THIS REPORT INCLUDES THE TEXTS OF THE PROFESSIONAL DELIBERATIONS DURING THE SEMINAR AND THE INDIVIDUAL PLANS OF ACTION FORMULATED BY THE VARIOUS STATE GROUPS. (JH)

ED003763

THE
TITLE VII
RESEARCH SEMINAR

VII

APRIL 11-13, 1960
BOULDER, COLORADO

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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THE

TITLE VII

RESEARCH SEMINAR

April 11-13, 1960

UNIVERSITY OF COLORADO

BOULDER, COLORADO

ED003763

EDITED BY

Robert E. de Kieffer

Director, Bureau of Audio-Visual Instruction

and

Associate Professor of Education

University of Colorado

Robert E. de Kieffer
Seminar Co-Chairman

LeRoy V. Good
Seminar Co-Chairman

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Foreword

Title VII of the National Defense Education Act, enacted on September 2, 1958, concerns itself with research and experimentation in more effective utilization in television, radio, motion pictures, and related media for educational purposes. Part A of the Title devotes attention to experimentation and research in the use of these newer media in improving educational opportunity. Part B is concerned with the dissemination of research findings for use in improving instruction in the classroom.

In November, 1959, representatives of twelve states in the Rocky Mountain-Plains region assembled in Boulder, Colorado, and planned a Title VII Research Seminar. It was agreed that persons interested in initiating research in the use of the newer communications media and those interested in the use of research findings would be brought together to discuss and design action programs in the use of such media for the improvement of educational opportunities for the youth of the region and the Nation.

This report portrays the high level of professional deliberations which transpired and the thoughtful plans of action which were formulated. It is certain that in the years to come the mental stimulation generated at this seminar will be a factor in finding new and improved ways of improving instruction at all educational levels.

Eugene H. Wilson
Vice-President
University of Colorado

TITLE VII RESEARCH SEMINAR - PROGRAM

Monday, April 11

8:00 A.M.----------------Registration: Main Lobby, University Memorial Center

9:00 A.M.----------------Forum Room, Ground Level

Chairman: Dr. Robert de Kieffer, University of Colorado

Welcome: President Quigg Newton, University of Colorado

9:15 A.M.----------------"What is Good Research?" (Criteria)

Dr. C. Walter Stone, Director, Educational Media

Branch, U. S. Office of Education

9:45 A.M.----------------I. What Are the Learning Problems?

A. "A Look at Learning Theories"

Dr. Mark May, Professor of Psychology and Director of Institute of Human Relations, Psychology Department, Yale University

10:30 A.M.----------------Informal Coffee

10:45 A.M.-------------------B. "New Directions in Education"

Dr. Ernest Melby, Professor of Education, Michigan State University

11:30 A.M.----------------Discussion Groups

Group 1- 416 UMC
Group 2- 420 UMC
Group 3- 421 UMC
Group 4- 422 UMC
Group 5- 423 UMC
Group 6- 424 UMC

12:30 P. M.----------------Luncheon--Persian Room

2:00 P.M.----------------II. What Are the Implications of the Learning Problems to the Role of Education?

A. "The Implications As They Relate to Teachers and Teaching"

Dr. Walter K. Beggs, Dean, College of Education, University of Nebraska

2:45 P.M.----------------Informal Coffee

3:00 P.M.--------------------B. "The Implications As They Relate to School Facilities, Classrooms, and Materials Centers"

Mr. Maurice Mitchell, President, Encyclopaedia Britannica Films, Inc., Wilmette, Illinois

4:00 P.M.----------------Discussion Groups

Group 1- 416 UMC
Group 2- 420 UMC
Group 3- 421 UMC
Group 4- 422 UMC
Group 5- 423 UMC
Group 6- 424 UMC

6:30 P.M.----------------Dinner--Persian Room

7:30-9:30 P.M.-----------Reports from Discussion Groups--Forum Room

Tuesday, April 12

9:00 A.M.----------------Chairman: Dr. LeRoy V. Good, State of Colorado, Department of Education

III. What Is the Role of Newer Media As Related to New Directions in Education?

A. "Teaching Machines, An Introduction For Researchers"

Dr. Edward Fry, Asst. Professor, Loyola University, Los Angeles

10:00 A.M.---------------Informal Coffee

10:45 A.M.------------------B. "Television"

Mr. James Robertson, National Educational Television, New York City

C. "Other Systems (Team Teaching, Learning Laboratories)"

Dr. Lindley Stiles, Dean, College of Education, University of Wisconsin

11:45 A.M.-12:45 P.M.---Luncheon--Persian Room

1:00 P.M.---------------IV. What Are the Implications of Media Research for Learning and Teaching?

A. "Organizing for Learning and Teaching"

Dr. Leslie Greenhill, Director, Division of Academic Research and Services, Pennsylvania State University

B. "Development of Facilities and Equipment"

Dr. A. J. Foy Cross, Professor of Education, New York University

2:45 P.M.--------------Informal Coffee

3:00 P.M.------------------C. "Utilization of Teachers"

Mr. Kenneth Oberholtzer, Superintendent of Schools, Denver, Colorado

4:00 P.M.--------------Discussion Groups

Group 1-	416 UMC
Group 2-	420 UMC
Group 3-	421 UMC
Group 4-	422 UMC
Group 5-	423 UMC
Group 6-	424 UMC

6:30 P.M.--------------Dinner--Persian Room

7:30-9:30 P.M.---------Reports from Discussion Groups, West Ballroom

Wednesday, April 13

Chairman: Dr. Robert de Kieffer

9:00 A.M.---------------V. What Is Involved in Determining Research Needs, Discrimination, and Utilization?

A. "Areas of Needed Research"

Dr. William H. Allen, Director of Research
Department of Cinema, University of
Southern California

10:00 A.M.--------------Informal Coffee

B. "Implementing Research into Action"

Dr. Kenneth Anderson, Dean, College
of Education, Kansas University

11:30 A.M.-12:30 P.M.---Discussion Groups by State

Arizona---------421 UMC
Colorado--------425 UMC
Idaho-----------East Ballroom Lounge-UMC
Kansas----------East Ballroom Lounge-UMC
Montana---------423 UMC
Nebraska--------230 UMC
New Mexico------420 UMC
Oklahoma--------336 UMC
South Dakota----229 UMC
Texas-----------416 UMC
Utah------------422 UMC
Wyoming---------424 UMC

12:30-2:30 P.M.---------Luncheon--Persian Room

2:30 P.M.---------------Seminar Adjourned

TITLE VII RESEARCH SEMINAR--STATE GROUPS AND GUESTS

ARIZONA

Seated (l. to r.): Jim Caceletto, Irma Pace, Richard Lloyd, A.N. Gandrud, C.B. Merritt.
Standing: Wendell Eckolm, Richard Bell, John Vergis, William Allen, Joel Benedict.

COLORADO

Seated (l. to r.): Leo Black, Leslie Grimes, Maurice Mitchell (Ill.), Gail Epperson, Robert de Kieffer, Edward Fry (Calif.), James Robertson (N.Y.).
Standing: LeRoy Good, John Swenson, Betty Jean Lee, Ted Albers, Lewis Crum, Herman Weisman, Elizabeth Golterman, Walter Stone (Wash., D.C.), Russell Porter, Mel Eckard, Richard Stevens.

IDAHO

Seated(l. to r.): W.W. Snyder, Earl Glade, Thomas Dahle.
Standing: Roger Walters, Thomas Bird, Frank Tate, Malcolm Alred.

KANSAS

Seated (l. to r.): George L. Cleland, Fred Montgomery, Kenneth Anderson, Gwendel Nelson.
Standing: Rolland Alterman, H.P. Rumford, George Frey, M.C. Moggie

MONTANA

Seated (l. to r.): John Fell, Eleanor Dougherty, Mrs. William Nelson, Mrs. Emil Olander, Walter Marshall.
Standing: Maurice Hickey, Parks Whitner, Erlin Jorganson, Del Langhell, Hardy Berry.

NEBRASKA

Seated (l. to r.): John Bobbitt (Ill.). Kenneth Findley, John Lynch, W. C. Meierhenry, Robert Stake, William Jaynes, Dr. Mark May (Conn.).
Standing: W.K. Beggs, Wm. Schindler, Craig Fullerton, Lester Hunt, Leonard Hansen, J. Elmer Dalton, Daol Morris, Richard Brown, Barton Kline.

NEW MEXICO

Seated (l. to r.): Joseph Michel, Wm. Davies, George P. White, Merrell Thompson, Mrs. Ellen Digneo.
Standing: Wm. Runge, Edward Werner, Roy Frye, Joe Lawler, Marion Cline, Joe Place, Wayne Bundy.

OKLAHOMA

Seated (l. to r.): E.W. James, Stanley Dixon, Ted Anderson, Leon Hibbs.
Standing: J.G. Stratton, Sr., Leslie Greenhill (Penn.), Merle Glasgow, Jack Parker, R.W. Scofield.

SOUTH DAKOTA

Seated (l. to r.): Robert Blace, Alphus Christenson, Fred Peterson, Sanford Witter.
Standing: William Elliott, Lloyd Uecker, O.B. Stamper, William Baldwin.

TEXAS

Seated (l. to r.): Ernest Tiemann, Will Blair, Nat Williams.
Standing: E.L. Galyean, Donald Denum, Mrs. Nettie Shaw, Morris Wallace, L.P. Sturgeon, Milo Kearney.

UTAH

Seated (l. to r.): John Larson, Walter Borg, Elliot Howe, Ernest Melby, Mrs. Arletta Williams.
Standing: Oakley Gordon, Glen Oldroyd, Alton Hadlock, Keith Engar, George Marchant, Donald Brumbaugh.

WYOMING

Seated (l. to r.): Elmo Prine, John W. Reng, Daniel Deti, Harlen Bryant.
Standing: Goldie R. Huey, Wm. L. Wells, Mrs. K. D. Knapp, Gene Waldmann.

TITLE VII RESEARCH SEMINAR - LIST OF PARTICIPANTS

ARIZONA

Richard H. Bell, Coordinator
Director, Radio & Television
Arizona State University
Tempe, Arizona

Dr. Joel A. Benedict
Director of A-V Bureau
Arizona State University
Tempe, Arizona

James Caceletto
Pres. Arizona A-V Education Assoc.
Balz Elementary School
Phoenix, Arizona

Wendell Eckolm
Director A-V Aids
1010 E. 10th Ave.
Tucson, Arizona

A.N. Gandrud
Executive Secretary
Rep. Ariz. School Board Assoc.
4833 No. 31st Street
Phoenix, Arizona

Dr. Richard E. Lloyd
Assoc. Professor of Education
Arizona State College
Flagstaff, Arizona

Dr. Curtis B. Merritt
Acting Dean, College of Education
University of Arizona
Tucson, Arizona

Mrs. Irma Pace
Curriculum Coordinator
Yuma Elementary Schools
Yuma, Arizona

Dr. John P. Vergis
Assoc. Professor of Education
Arizona State University
Tempe, Arizona

COLORADO

LeRoy V. Good, Coordinator
Dir., Div. of Ed. Beyond the
High School
State Department of Education
Denver, Colorado

Dr. Theodore Albers
Department of Education
Denver 2, Colorado

Dr. Cliff Bebell
Department of Education
Denver 2, Colorado

Leo P. Black
Assistant Commissioner of Educ.
State Department of Educ.
Denver, Colorado

John C. Blair
Supervisor, Audio-Visual
Jefferson County R-L Schools
Lakewood, Colorado

Dr. Lewis Crum
Manager, Curric., Research
and Service
Englewood Public Schools
Englewood, Colorado

Dr. Robert de Kieffer
Director, Bureau of Audio-Visual
Instruction
University of Colorado
Boulder, Colorado

Dr. Mel Eckard
T.V. and Radio Specialist
Colorado State University
Fort Collins, Colorado

James T. Johnson
Denver Public Schools
Denver, Colorado

Professor Noel Jordan
University of Denver
Denver, Colorado

Miss Betty Jean Lee
Denver Post
Denver, Colorado

Delbert Lobb
Jefferson County Schools
Lakewood, Colorado

Terry F. Lunsford
Staff Assistant
Western Interstate Commission
for Higher Education
Boulder, Colorado

Professor Russell Porter
University of Denver
Denver, Colorado

Richard Stevens
N.A.E.B.
1735 Glen Carry Dr.
Lakewood, Colorado

Dr. John H. Swenson
Acting Commissioner of Education
Denver 2, Colorado

Dr. Lloyd G. Swenson
Dir. of Instr.
Jefferson County Public Schools
Lakewood, Colorado

Dr. Herman Weisman
Colorado State University
Fort Collins, Colorado

E. H. Wilson
Vice-President
University of Colorado
Boulder, Colorado

IDAHO

Dr. William W. Snyder, Coordinator
Professor and Head, Department of
Communications
University of Idaho
Moscow, Idaho

Malcolm Alred
State Curriculum Director
State Department of Education
Boise, Idaho

T. C. Bird
Superintendent of Schools
Boise, Idaho

Thomas Dahle
Director of Adult Education
and Extension Services
University of Idaho
Moscow, Idaho

Earl Glade, Jr.
Station Manager
KBOI-TV
Boise, Idaho

Frank Tate
Idaho State College
Pocatello, Idaho

Roger Walters
Television Coordinator
Idaho State College
Pocatello, Idaho

KANSAS

George Frey, Coordinator
State Department of Public
Instruction
Topeka, Kansas

Dr. Rolland Alterman
Director, Audio-Visual Services
Kansas State Teachers College
Emporia, Kansas

Dr. George L. Cleland
Director, Division of Instruction
Services
State Department of Public
Instruction
Topeka, Kansas

Maurice C. Moggie
Professor
Kansas State University
Manhattan, Kansas

Fred Montgomery
Director, Bureau of Visual Inst.
University of Kansas
Lawrence, Kansas

Dr. Gwendel A. Nelson
Director of Research
Wichita Public Schools
428 South Broadway
Wichita 2, Kansas

H.P. Rumford
Kansas State College
Pittsburg, Kansas

MONTANA

Hardy D. Berry, Coordinator
Director of Information
Montana State College
Bozeman, Montana

Miss Eleanor Dougherty
College of Great Falls
Great Falls, Montana

Dr. John L. Fell
Academic Head, Film and TV Dept.
Montana State College
Bozeman, Montana

Maurice Hickey
Vice President
Montana Education Association
Ennis, Montana

Dr. Erling Jorgenson
School of Journalism
Montana State University
Missoula, Montana

Del Langbell
Superintendent of Schools
Kalispell Public Schools
Kalispell, Montana

Walter Marshall
Broadcaster
129 No. Jackson
Helena, Montana

Mrs. William Nelson
910 Diamond
Butte, Montana

Mrs. Emil Olander
P.O. Box 236
Miles City, Montana

Parks Whitmer
State Department of Public Instruction
Helena, Montana

NEBRASKA

Dr. Wesley Meierhenry, Coordinator
Assistant to the Dean of Teachers College
University of Nebraska
Lincoln, Nebraska

Richard Brown
Executive Secretary
Nebraska State School Board Association
Holdrege, Nebraska

Dr. John Elmer Dalton
Professor of Education and President of the Nebraska State A-V Assoc.
Lincoln, Nebraska

Dr. Kenneth Findley
Chairman of Graduate Council
State Teachers College
Chadron, Nebraska

Dr. Barton Kline
President
State Teachers College
Chadron, Nebraska

Dr. Craig Fullerton
Assistant Superintendent
Omaha Public Schools
Omaha, Nebraska

Leonard Hansen
Superintendent of Schools-Ogallala
President, Nebraska Assoc. of School Administration
Ogallala, Nebraska

Dr. Lester Hunt
Assistant to the President
State Teachers College
Kearney, Nebraska

Dr. William Jaynes
Director of Industrial
Testing and Research
University of Omaha
Omaha, Nebraska

John E. Lynch
Executive Secretary
Nebraska State Education
Association
Lincoln, Nebraska

Dr. Paul Morrie
Superintendent of Schools
Kearney, Nebraska

William Schindler
Director of Research
State Department of Education
Lincoln, Nebraska

Dr. Robert Stake
Assistant Professor of
Education & Psychology
University of Nebraska
Lincoln, Nebraska

NEW MEXICO

Joe Lawler, Coordinator
Director of Information
State Department of Education
Santa Fe, New Mexico

Dr. Wayne Bundy
Production Manager
KNME-TV
Albuquerque, New Mexico

Dr. Martin Cline
Professor of Education
Designer of Research
New Mexico Highlands University
Las Vegas, New Mexico

William Davies
Director of A-V Instruction
Albuquerque Public Schools
Albuquerque, New Mexico

Mrs. Ellen Digneo
Director of A-V Instruction
State Department of Education
Santa Fe, New Mexico

Roy Frye
Director of A-V Instruction
Roswell Public Schools
Roswell, New Mexico

Joseph Michel
Director of Languages
State Department of Education
Santa Fe, New Mexico

Joe C. Place
Director, AV
Eastern New Mexico University
Portales, New Mexico

Dr. William Runge
Professor of Education
University of New Mexico
Albuquerque, New Mexico

Dr. Merrell E. Thompson
Professor of Education
Designer of Research
New Mexico State University
University Park, New Mexico

Edward C. Werner
AV Director
New Mexico Western College
Silver City, New Mexico

OKLAHOMA

Dr. Leon Hibbs, Coordinator
Director of TV Education
State Department of Education
Oklahoma City, Oklahoma

Dr. Ted C. Anderson
Supervisor of A-V Education
Tulsa Public Schools
Tulsa, Oklahoma

Stanley Dixon
Superintendent of Schools
Waukomis, Oklahoma

Dr. M.W. Glasgow
Research Specialist
Extension Division
Oklahoma University
Norman, Oklahoma

Dr. Edward James
Dean of Instruction
East Central State College
Ada, Oklahoma

Jack F. Parker
Assistant Superintendent
Oklahoma City Public Schools
Oklahoma City, Oklahoma

R.W. Scofield
Asst. Prof. of Educ. Psychology
Oklahoma State University
Stillwater, Oklahoma

J. G. Stratton, Sr.
President, Clinton Board of Education
515 South 14th
Clinton, Oklahoma

SOUTH DAKOTA

Robert Blake, Coordinator
Director of A-V Education
Sioux Falls Public Schools
Sioux Falls, South Dakota

William Baldwin
Assistant Superintendent
Douglas School System
Ellsworth Air Force Base
Rapid City, South Dakota

Dr. Alphus Christensen
Administrative Assistant
South Dakota State College
Brookings, South Dakota

William Elliott
Deputy Superintendent
State Department of Public Inst.
Pierre, South Dakota

Dr. Fred Peterson
Professor, Head Department of Secondary Education
State University of South Dakota
Vermillion, South Dakota

Dr. O.B. Stamper
Assoc. Professor, Head Department A-V Education
Northern State Teachers College
Aberdeen, South Dakota

Lloyd Uecker
Superintendent of Schools
Mitchell Public Schools
Mitchell, South Dakota

Dr. Sanford Witter
Superintendent of Schools
Lead Public Schools
Lead, South Dakota

TEXAS

Dr. Ernest Tiemann, Coordinator
Director A-V Instruction
University of Texas
Austin, Texas

Dr. Witt Blair
Dean, School of Education
North Texas State College
Denton, Texas

Dr. Donald Denum
Director, Division of Research
Texas Education Agency
Capitol Station
Austin, Texas

E.L. Galyean
Dir. of Research
Texas State Teachers Assn.
Austin, Texas

Dr. Milo Kearney
Director, Division of Teacher Education and Certification
Texas Education Agency
Capitol Station
Austin, Texas

Douglas F. Parry
Professor, Basic Division
Texas A and M College
College Station, Texas

Mrs. Dan Shaw
Carthage Independent Schools
Carthage, Texas

L. P. Sturgeon
Director of Public Relations
Texas State Teachers Assoc.
316 West 12th Street
Austin, Texas

Dr. Morris Wallace
Head, Department of Education
Texas Technological College
Lubbock, Texas

Nat Williams
Superintendent
Lubbock Independent Schools
Lubbock, Texas

UTAH

Dr. Alton P. Hadlock, Coordinator
Dir. of Adult Education
State Department of Public Inst.
Salt Lake City, Utah

Dr. Walter Borg
College of Education
Utah State University
Logan, Utah

Dr. Donald Brumbaugh
Director of A-V Education
College of Education
University of Utah
Salt Lake City, Utah

Dr. Keith Engar
Director
Educational Television
Station KUED
University of Utah
Salt Lake City, Utah

Dr. Oakley Gordon
Assoc. Professor of Psychology
University of Utah
Salt Lake City, Utah

Dr. Elliot Howe
Director of Junior High
Schools
Alpine School District
American Fork, Utah

John Larsen
Assistant Superintendent
in charge of TV Education
Weber County School District
1122 Washington Blvd.
Ogden, Utah

George Marchant
General Administrator
Granite School District
3212 South State
Salt Lake City, Utah

Glen Oldroyd
Director of Secondary Education
Unitah School District
Vernal, Utah

Mrs. Arletta Williams
Supervisor
Elementary Education
President, State ASCD
Davis School District
Farmington, Utah

WYOMING

William L. Wells, Coordinator
State Department of Education
Laramie, Wyoming

Dr. Harlan Bryant
Dean, College of Education
University of Wyoming
Laramie, Wyoming

William Day
Science Consultant TITLE III
NDEA, and Instruction Lab.
School
University of Wyoming
Laramie, Wyoming

Daniel V. Deti
Modern Language Instruction and
State Modern Language Assoc.
Coordinator
Casper College
Casper, Wyoming

Mrs. Goldie Huey
A-V Director Elementary Schools
Administration Offices
Casper, Wyoming

Mrs. K.D. Knapp
Vice-President Wyoming School Board
Association
705 South Lincoln St.
Casper, Wyoming

Elmo L. Prine
A-V Director Secondary Schools,
and Teacher Social Studies Sr.
High School
Laramie, Wyoming

Dr. John W. Reng
Superintendent
Fremont County Vocational High
School
Lander, Wyoming

Eugene Waldmann
A-V Coordinator Public Schools
Administration Building
Cheyenne, Wyoming

Monday, April 11.

Dr. Robert de Kieffer, Seminar Co-Chairman:

Assembled in this room are 151 persons from twelve different states in the Rocky Mountain-Plains Region. It is going to be interesting to observe the results of our deliberations. I sincerely hope that this meeting will not be just another conference to which persons come and listen to presentations and then go home and cogitate about them. This seminar should produce results in terms of action. We cannot measure the success of this seminar in terms of what we say here. Its success will be dependent on what actually transpires in the years to come.

The twelve state coordinators, at their meeting in November, held no preconceived ideas concerning what might materialize in the future. It is up to you to give final directions concerning educational research in the mass media in the Rocky Mountain-Plains Region. At the end of the next three days, we might ask ourselves this question: Is the seminar technique an effective method by which people from various states can coordinate their ideas and implement them into plans for action?

Our discussions will be centered around three major topics:

1. "Conducting Research in the Mass Media"
2. "Disseminating Research Findings"
3. "Utilizing Effective Practices Proven by Research"

When we are discussing research, I hope that we do not limit our thinking to those research studies directed only at college level education. We must consider research at all educational levels from the kindergarten through adult education. Also, we must not lose sight of the fact that good research should make a difference to the education of students in the classrooms of America.

Dr. Eugene Wilson, Vice-President of the University of Colorado, who is attending this seminar as a participant, is your official host.

Dr. Eugene Wilson, University of Colorado:

We consider it a high honor and a privilege to be serving as hosts for this particular seminar. The pre-planning conference held last November, and the planning that has gone on since assures me that this will be one of the most outstanding seminars to be held at this institution.

This research seminar will deal intensively with what I consider to be one of the most significant titles of the National Defense Education Act. In terms of potential effect of university programs, the newer educational media, their possibilities and potentials, the more effective utilization of faculty, may solve some of the real problems which this University and others face in the years to come.

We shall follow with great interest the discussions of this seminar and seriously consider how we may apply the ideas and recommendations that will be forthcoming.

We are delighted to have you here on our campus and hope the three days will be as beneficial to you as I am sure they will be to me.

Dr. Robert de Kieffer:

We have a man at this seminar who will be of immeasurable value to all of us in the years ahead. He is Dr. Walter Stone who will discuss the topic, "What is Good Research?"

Dr. Walter Stone, the Director of the Educational Media Branch, U. S. Office of Education in Washington, is presently on leave from the University of Illinois where he is a Professor of Library Science. For the past decade, he has been closely associated with and active in the field of audio-visual communications.

Dr. Walter Stone:

It's a privilege for me to meet with you in Boulder this morning and to report chiefly on some work being done and that being planned to carry forward research projects supported under the provisions of Part A of Title VII of the National Defense Education Act. Continuing interest expressed by researchers across the nation and the very direct encouragement and counsel we have received from numerous individuals in this audience (ever since the Act was passed) lead us to feel, in submitting a brief review of the first two years of Title VII research, that we are sharing with colleagues and vitally interested partners a record of joint accomplishment....

Now for those who might welcome a quick review of Title VII before we talk about specific research projects and programs (and then briefly discuss criteria), let me say that, in essence, Title VII calls for a carefully delimited program of research, experimentation, demonstration and dissemination of information on ways in which newer media of communication, i.e. television, radio, motion pictures, video tape, filmstrips, related materials and equipment, can be used most effectively in education. But a small part of the total NDEA, Title VII authorized expenditures of up to 18 millions of dollars during the four-year life of the Act for the administration of research grants, contracts and staff work to find new and better ways of utilizing and adapting newer media for instruction, training teachers for better use of the media, presenting academic subject matter and telling the story of needs, ways and means for achieving improved use of the media through surveys and studies, publication of manuals, guides, bibliographies and catalogs, research reports, and through the provision of needed technical advisory services, demonstrations and conferences.

During the first year of the New Educational Media Program, there was appropriated one million 6, and this year 3 million dollars to carry out the purposes of Title VII. To date, we have received more than 600 formal applications for research grants of which (from the first 433+) some 85 have been approved by the Advisory Committee on New Educational Media (a 14-man advisory group established by law), and these have been negotiated and awarded to non-profit organizations. Twenty-three contracts for dissemination activities have also been developed to implement the information program which the Commissioner is charged to undertake. (This program will be reviewed at another time.) And in all, there has been obligated and committed to date approximately 7 millions of dollars plus in behalf of Title VII projects.

Such facts and figures are interesting and they do tell a part of the story -- but only a very restricted part. The heart and core of Title VII is, of course, the research in progress; and the steady flow of information now beginning to reach school systems, colleges, universities, and other organizations. And the story is, of course, one of people -- people with ideas and a real sense of purpose -- and I should also add dedication. Let me tell you about some of the research projects now underway, how they were evaluated, and the purposes behind them.

About half of the research grant applications received to date and about half of the grants-in-aid given for support of research projects in one way or another concern educational applications of television -- television for teacher training (open-circuit, closed-circuit, video tape and kinescope) -- teachers and classrooms on the air for the benefit of future teachers at San Jose, California, Minnesota, Michigan State, Hunter college in New York City. I recall at this moment a recent visit to one of these schools to a class in psychology of about 25 teachers who were observing youngsters in a public school classroom in another part of the city. A running commentary was offered by the Professor on the campus and two-way communication directly with the classroom teacher was used whenever necessary to ask why a particular method or tactic was being introduced into the classroom.

Other television projects include the following types:

TV for direct teaching of physics, chemistry, dentistry, medicine; TV to help bridge the gaps between high school and college with summer instruction for prospective freshmen beamed, for example, to greater Miami homes by the University of Miami -- bridging the gap between pre-school play around the house and the experiences of first grade (TV orientation if you like, both for the parent and the child). TV to serve gifted youngsters, take Maine as one example, reaching out to rural schools with supplementary instruction in science and math or modern foreign languages which would not otherwise be available -- administrative uses of television and other projects of equal interest. TV knitting together, in Texas, network style, 11 different colleges within the State to share instructional resources.

Perhaps a third of all the research grants awarded under Title VII are in one way or another addressed to problems associated with instruction which require production and testing of new materials, films and filmstrips slides, overlay transparencies and the like. Admittedly, a special and dramatic case, the John Tracy Clinic in Los Angeles in conducting an experiment involving development of films and other materials to help the parents of deaf children prepare these youngsters for participation in public education.

And then, in a small but rapidly growing and significant cluster, there are the projects concerned with development, testing and application of new devices to aid self-learning and self-testing -- the teaching machines....

Several projects relating to teaching machine problems are now being supported under Title VII. Among these are studies which emphasize direct application of such devices on school or college work levels as well as others concerned with basic issues in the analysis of learning. One study having special interest calls for the use of teaching machines to complement the viewing of television programs. The implications of such an experiment for the ultimate improvement of our educational service to the home-bound stands out in this project. Other examples include a study initiated recently in Pittsburgh, Pa. This project will develop and evaluate techniques for using self-instructional devices to teach independent thinking and problem solving. Another study being conducted by the Edward R. Johnstone Training and Research Center in Bordentown, New Jersey, will review the use of self-instructional devices with youngsters suffering from mental retardation. Here new and basic issues will be studied including the effects on learning of providing tangible rewards for correct responses and the effect of difficulty levels on motivating performance.

Teaching machines, of course, as you doubtless will hear them discussed at this conference may range in size and cost from an item having negligible cost, perhaps no more elaborate than a peg board with varying depths of holes, on up to the electronic brain or computer. But in general, the following factors or elements are usually represented: First, a mechanical and/or electronic system for introducing the new information to be learned, usually visual. Second, a sequential presentation of questions or problems which require separate responses from the learner. Third, a system which can accept and then or later evaluate responses developed or selected by the student. And fourth, a system which informs the student of the accuracy of his responses immediately after he makes it (or takes the response more fully into account in selecting the next item of information, the question or the problem which is presented).

The research and experimentation now going on in the development of such devices is exciting not only to educators apparently, but to some of the largest commercial and industrial groups in the United States. In a negative and completely unrealistic sense, it is also exciting to some working in education who fear they themselves to be expendable as well as to some commercial proponents of specific media who fear a threat of economic loss. And there is, indeed, as I would see it, one very real danger in this new field which is that, in our effort to be first, the development and sale of hardware may far outrun the programming, the latter of course depending very much upon very careful controlled studies of the learning which is required to do a particular job and the ways in which such learning must be sub-divided into units which are susceptible to machine treatment....

Thus far, we have been reviewing the nature of research projects supported under Title VII. Now and more briefly I should like to discuss the main criteria which are employed in evaluating Title VII research proposals.

Each research grant application is read and judged by members of the Advisory Committee on New Educational Media with five main criteria in mind: (1) Pertinence- Is the proposed project truly relevant to the purposes of Title VII; (2) Significance-To what extent will this project contribute to the development of new and more effective techniques and methods for utilizing and adapting new media, training teachers to use new media, or for presenting subject matter through new media; how significant is the educational problem on which this proposal is focused; how generalizable are the anticipated outcomes of the proposed research; (3) Research and experimental design-Is the problem clearly defined; does the proposed research grow out of an adequate knowledge of related research; to what extent does the proposed project duplicate previous research and/or research currently being supported under Title VII; are the questions to be answered or hypotheses to be tested well formulated and clearly stated; how adequate is the research procedure or experimental design (including controls, sampling, data gathering instruments, etc., where appropriate); how appropriate are the plans for analysis of the data to be collected; (4) Personnel and facilities-To what extent has the director or principal investigator demonstrated his competence for directing research in the area involved; does the institution or agency submitting the proposal have, or will it obtain, adequate facilities for carrying out the project; (5)Ecomic efficiency-How economical is the suggested approach to the problem in terms of over-all cost as compared with the cost of alternative approaches.

These then are the criteria, stated formally. To review them in more informal terms we might simply ask ourselves these questions:

1. Does the idea fit the law?
2. Is it a really important idea?
3. Is it feasible--can it be done as planned?
4. Is the man qualified and does he have the necessary equipment and facilities?
5. What will it cost? Is it properly priced?

Of these questions, number two and number four are the most important. Given affirmative answers to these, the rest usually fall right into place with some important exceptions which should be noted. First, we cannot afford to support very much in the way of duplicated effort, no matter how important the idea or worthy the researcher. Second, sometimes, the bigger the idea and the better known and more talented the investigator, the more difficult it may prove (especially in early planning stages) to specify on our application forms details of the project which we must require because we are dealing with public funds (and must have in advance of any work a reasonable estimation of exactly how the tax dollars will finally be spent).

What are the chief weaknesses discovered in research applications which have been submitted under Title VII to date? There are two weaknesses which are most evident: (1) a paucity of important ideas; and (2) poor research planning and design.

Anticipating your immediate question, let me raise it for you-- Are those who evaluate Title VII projects putting too much emphasis on design? In my opinion, the answer is a decided "No"! A sound proposal which sets forth a problem clearly and asks intelligent questions about it is never down-graded very far for any apparent lack of great sophistication in the theories and practice of estimating probability. Nor do the so-called "pros" get by simply on "slick" design. I think it will not surprise you to learn that we seldom face the problem in Washington because really vital well-stated questions are usually put forward by good research minds which (alone or with the help of specialists) have taken the trouble to think their aims through and suggest the most appropriate ways and means of obtaining reliable and valid answers....

If our discussion time during this seminar permits, I should like to talk later about other problems associated with the evaluation of research proposals including requests for production of new materials, budget statements, needed research and like matters. Also, during the seminar, some time must be found to introduce, at least briefly, an important new book which has just been published, called New Teaching Aids for the Ameri-Classroom, a symposium on the state of research by Carpenter, Hilgard, Hoban, Kanner, Lumsdaine, Riley, Spaulding, Tyler, edited by Wilbur Schramm--Stanford, 1960. This very fine volume presents edited papers originally offered at a conference convened with Title VII funds in Palo Alto, California....

Now, rather than concluding with a brief summary or formal closing, I should like to end these remarks with an expression of personal feeling about this seminar, which is the first of four regional research conferences to be supported this year with Title VII funds.

Twelve states are represented here this morning by 151 individuals. I very much hope that by each individual and for each state this meeting will be judged a beginning. Without knowing what next steps might be, let me anticipate that they might include at least some of these things:

1. Stimulation of new research interests which in turn will lead to some new important activities developed by individuals and institutions not previously active in the field of newer media.

2. Formulation of some new plans for cooperative research projects to be developed by several individuals and/or institutions within single states and(when appropriate) across state lines.

3. (As the results of #1 and #2) Discovery of more common regional educational interests and problems looking toward possible demonstrations for the purpose of field testing and showing all who may be concerned what can be accomplished using new media approaches.

4. (finally) Crystallization of thinking about plans which eventually could lead in this part of the country to the establishment of one or more permanent regional centers dedicated to doing research in this field, centers which would be fully equipped, and properly staffed, being served by and serving all with support obtained from many sources and types of sources including local, state regional and national interests....

Dr. Robert de Kieffer:

Dr. Walter Stone has presented four major questions for our consideration. These were:

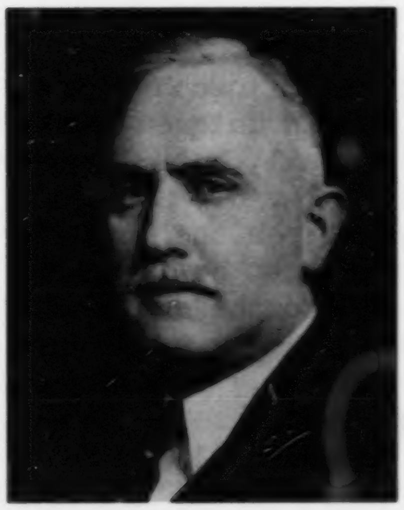
1. What are the dangers we are facing at the current time?
2. What can be done in developing a positive approach to meet these dangers?
3. What are the criteria for good research?
4. What are my hopes and dreams for this conference?

Dr. Robert de Kieffer:

This seminar might be likened to a chemical formulation. We have 151 active ingrediants or elements. Instead of speakers, we have catalysts. The people who will be presenting us with new ideas will be changing the formulation of of this group.

The next three days might be considered as reaction time. It is difficult to determine at this point whether the reaction will result in a new active compound or an explosion. After each presentation, you will have an opportunity to ask questions.

Our next catalyst, Dr. Mark May, needs no introduction because he is so familiar to all of us. He has been prominent in research in the areas of mass media over the past twenty years. Within the larger context of the learning problems, Dr. May will discuss the subject, "A Look at Learning Theories".



Dr. May has had a long and brilliant professional career as a psychologist and researcher. Following World War II, he was the chairman of a special commission on Motion Pictures of the American Council on Education, which resulted in a book entitled "Learning From Films." As the Director of the Yale Institute of Human Relations, Dr. May has been associated with the development of learning theory in cooperation with Hull, Miller, and Dollard.

Dr. Mark May:

Man's capacity to learn is his greatest asset. The total learning potential of a nation is its greatest national resource. Without this tremendous ability to learn not only by individual experience, but to learn from others and from what preceding generations have learned, a society would be utterly unable to develop and use its natural resources. The history of man's achievements and particularly recent advances in the development of atomic power and space explorations, demonstrate clearly the almost unlimited potential of human abilities.

The major purpose of all research in the basic sciences of behavior and in the important fields of education, psychiatry, and child rearing is the improvements of methods and procedures for identifying and developing the potential brain power of humans generally, and particularly that of our own nation. One road to this goal, and perhaps the surest road, is the achievement of deeper and better understanding of the nature of human nature and how it is shaped by learning. The purpose of science is to provide understanding. The understanding of human potential and how it is realized calls for the development of a science of human behavior and of learning.

In the development of any science, theory plays an important role. Twenty years ago Einstein[1] defined science as: "the attempt to make the chaotic diversity of our sense-experience correspond to a logically uniform system of thought. In this system single experiences must be correlated with the theoretic structure in such a way that the resulting coordination is unique and convincing.

"The sense-experiences are the given subject-matter. But the theory that shall interpret them is man-made. It is the result of an extremely laborious process of adaptation: hypothetical, never completely final, always subject to question and doubt."

This definition reminds us that the word theory stems from the Greek work thea meaning a show, spectacle-i.e., a sense experience. From the same stem we get the work"theater". The noun theoros is a spectator, or an observer; the verb theoria means to behold, contemplate and speculate. Thus when man gazes upon the spectacles of the phenomenal world, or upon himself and contemplates the origin, nature, and meaning thereof, he is theorizing. The results of his contemplations are his theories.

This broad conception covers all kinds of theories--philosophical, theological and scientific. Scientific theories have certain unique characteristics. First, as Einstein said they are never final, but always subject to revision as more sense-experience is accumulated. Second, they can be tested by appeal to facts. The correlation between the logical system of ideas and particular aspects of sense-experience must be "unique and convincing." Hence by feeding new factual data back into the system of ideas, the theory is self-corrective. Third, a scientific theory tells the investigator where to look and when to look for new facts, i.e., for new sense-experience. The discovery of the planet Pluto, and the observation that light has gravity are two of many illustrations. Hence a major role of theory is the advancement of empirical knowledge.

This is accomplished in several ways. First, a well formulated theory is a fruitful source of hypotheses to be tested by observation or experiment. A familiar illustration is provided by any textbook in plain geometry. The theorems to be proved by the student are arrived at by logical deduction from a limited number of basic axioms, definitions, and rules for manipulating them. Starting with arbitrary definitions of straight lines, parallel straight lines, and the number of degrees on a straight line, it can easily be deduced that the number of degrees in any triangle is 180. This deduction can be checked empirically by actually measuring the angles of a large number of triangles of all shapes and sizes; but they must be on plane surfaces. This requires, however, the existences of an appropriate measuring instrument, and an adequate technique for applying it. Measurements can be repeated until the investigator is convinced that the deduction is actually true to observed facts. The more theorems or hypotheses that can be logically deduced from a set of axioms or postulates and are testable by observation and measurement, the more useful the theory is for the advancement of empirical knowledge.

Some theories, however, are so loosely formulated that it is impossible to make rigorous logical deductions from them. They may, however, be very provocative, stimulating, and suggestive of new observations and experiments. An example is Freudian theory of personality development and and social adjustment. From the standpoint of producing new insights into the underlying mechanisms of human behavior this theory has been exceedingly stimulating and is often considered one of the greatest achievements in the field of psychology and psychiatry.

A second way in which knowledge is advanced by theory is that of indicating what experiments are unlikely to be fruitful. Thus time, effort and money are saved by cutting down the amount of sheer trial and error experimentation. As we shall see later, a great deal of the experimental research in the AV field has been that of trying out almost every conceivable condition that might possibly have an influence on learning from films. If better theory relevant to the learning tasks were available, it would be possible to make more accurate predictions concerning which of several sets of conditions are most likely to influence learning.

Third, a theory aids in the advancement of knowledge by providing general principles which will comprehend several kinds of facts. The classical example is the discovery of Newton that a falling apple, the swinging of a pendulum, and the orbits of planets and satellites are all instances of the principle of gravitation. In the field of psychology--intense hunger, thirst, pain, cold, blinding lights, and deafening sounds are all instances of primary drive, defined as very intense stimulation. A major goal of research in the AV field is the discovery of general principles that will comprehend a number of variables.

Fourth, a theory may advance knowledge by suggesting new techniques of observation, new experimental methods, and new ways of treating data. For example, astronomical theories have led to the improvements of telescopes, and biological theories to the invention of the electronic microscope.

Fifth, theories advance knowledge by serving as convenient devices for communication among scientists. In behavior theory, important theoretical concepts such as drive, motivation, reinforcement, expectancy, life space, are generally understood. This technical vocabulary of theoretical terms makes possible more effective communications between psychologists, and between researchers and teachers.

Having before us five ways by which knowledge is advanced by scientific theories, we now ask what has been the role of learning theories in AV research? The past 20 years have witnessed more experimental research in this field than has ever occurred before. It has been inspired in part by technical developments in the production and projection of motion pictures, television, and various media of graphic communication, and in part by the increasing demands on schools and colleges for teaching more knowledge to more pupils than ever before in the history of our country. Financial support for this research has come in part from research funds of the Army, Navy and Air Force, and in part from foundations and the motion picture industry. The additional support that is now provided by Title VII of the NDEA makes possible further expansion of several kinds of research in this field.

In considering the extent to which research in this field has been guided by learning theories, it is best to limit the discussion to experimental research which is aimed at discovering basic principles of production and utilization of classroom films. Research on TV and teaching machines is omitted for lack of time. Two main questions will be discussed. First, to what extent and in what ways have researches on learning from films been guided by learning theories; and second, what contributions can be made by AV research to the improvement theories of learning? Most of the experimental research in this field has been attempts to discover the conditions in which learning from films depends.

Three main kinds of films have been used--instructional, training, and motivational.

The learning tasks imposed by instructional films, may be rather simple such as acquisition of factual information; or more complex, such as grasping the meaning of a principle, understanding a process, and drawing conclusions or inferences from the content of the film. The accomplishment of these tasks is usually measured by gains on objective tests administered before and after the film is shown. Gains or losses on test scores constitute the dependent variables in the design of experiments. In some cases the dependent variable may be retention measured by successive tests at stated intervals. In other cases it may be the application of the knowledge to a given problem situation. There are, therefore, at least three kinds of dependent variables--(a) rate of acquisition or amount of acquisition per showing of the film, (b) rate of forgetting, (c) degree of transfer or application.

The experimental problem is to discover the basic conditions on which these main types of learning tasks depend. It may be that the various learning tasks for which most instructional films are used depend on a common set of basic conditions. It is more likely, however, that there are a few general conditions on which all these tasks depend, but other conditions that are specific to a task or type of task. As will be seen later a theory of learning from films consists of operational definitions of the basic independent variables and statements of how they are functionally related to the dependent variables.

The variable on which various learning tasks from instructional films are believed to depend are usually classified into film, audience, and utilization variables.

Film Variables

Film variables in experiments may be film vs. lecture or reading, motion picture film vs. film strip or various versions of the same film content. Other film variables are the many different possible versions of the same film content. Since sound films have both auditory and visual components each of these may be varied independently of the other.

Visuals have been varied in respect to artistic finish; color, optical effects, such as mock-ups, close-ups, montage, etc.; attention getting devices such as arrow, circles, etc. to emphasize relevant cues; titles spliced in to aid following the organization; printed question for motivation and testing; slow motion to emphasize certain points; repetition of certain sequences; idea density vs. idea sparcity (the amounts to be learned) and length of the film.

Variations in the verbal content include, live action dialogue vs. off-stage narration; tempo of the narration or amount of verbalization; expository narration vs. rhetorical questions; readability of the commentary; timing of the narration to relevant visual sequences; the use of two different voices in the narration.

Audience Variables

A partial list of audience variables that have been tested are grade levels, age groups, intelligence level, reading comprehension, previous instruction on the type of the film, amount of previous exposure to instructional films, socio-science background, sex, and religion. The effects of these variables on the learning tasks may be ascertained either by selection of experimental and control groups or by correlation methods whereby the audience is given various tests of intelligence, reading, etc. and the results correlated with gain in knowledge from the film.

Utilization Variables

These are variables determined by what is done before, during and after the film is shown. Included here is also repeated showings of the same or similar films to the same group. The variables which have been investigated include (a) introductory talk, (b) the employment of various devices for directing attention to parts of the film, (c) employment of motivation, such as announcing a test on the film. Variation during the showing can be (a) the employment of various participation or practice devices, (b) stopping the film for questions and answers, (c) note taking on the film while it is going on. Post film variations are (a) film review, (b) discussion of its contents, and other instructional activities.

Training Films

The dependent variables--the learning tasks--are always the acquisition of skill or proficiency in some performance. The tasks may be academic such as handwriting, typing, reading a slide rule, doing arithmetic and higher mathematics, learning a foreign language. Some tasks are the achievement of athletic skills; still others are tasks involved in industrial training. Research sponsored by the Navy and Air Force has been mainly on films for training recruits in the various skills and programs required by these services. Rate of improvement in all such skills and proficiencies is usually measured by performance tests.

The independent variables again may be grouped into film, audience, and utilization. Among those that have been tested experimentally are: variation in rate of development of the film; amount of repetition in the film; repeated showings of the film; showing or not showing errors in performance; slow motion vs. regular rate; subjective vs. objective camera angles; visual devices such as "pop ins"; plain version vs. various film embellishments; various forms of commentary; amount of words in the commentary; use of technical vs. non-technical films; stereoscopic sound films vs. the two-dimensional projection; and various devices for practice and participation.

Motivational Films

The dependent variables are learning tasks of two kinds. First, changes in opinions, attitudes, beliefs, preferences, etc. Second, the engagement in some performance after seeing the film. Performances that have been used are reading a book, seeking further information, brushing teeth, choice of diet, submitting to skin tests, volunteering for innoculation, choice of brands of commercial products, and many others.

The variables on which these changes in behavior depend are believed to be exceedingly complex. The audience variables loom large. Recent research on attitude change indicate wide individual differences in response to each particular communication. These differences are due mainly to personality factors. Variables that have been tried in this area of research include the prestige of the narrator, the perceived truthfulness, sincerity and objectively the presentation, kinds of arguments used, and a specially prepared motivational version of a film based on a book.

This brief review of types of learning required by these kinds of films, and a partial list of variables on which the learning of these tasks have been supposed to depend, will serve to introduce the question of the extent to which this large amount of exploratory research has been guided by learning theory. Going back now to the five ways by which factual knowledge is advanced by the use of scientific theory, we ask the following questions about TV research.

First, to what extent has the selection of independent variables been guided by learning theories? This question consists first in ruling out variables that are not worth trying, and second selecting those which, according to a theory are expected to exert an effect on the accomplishment of the particular learning task.

This question is not easily answered unless the experimenter reports the source of his ideas and the reasons for doing the reported experiment. If theory is defined in the broad sense of wondering, speculating, or guessing as to why a wide range of individual differences are found between amounts learned from a particular film; or why some films yield better learning on the average than others; or why some utilization devices are sometimes better than others; then it may be said that any experimenter who thinks at all, is making some use of theory. This is illustrated by variables that have not been tried. For example, no experimenter has tested the influences of the phases of the moon or the signs of the Zodiac on learning from films. No one has supposed that individual differences in children (at the same grade level) in head size, or height, or weight would have any influence on amounts learned from a film.

The sources of the hypotheses that have been tested by experiments may be placed on a continuum with two extremes. At one extreme hypotheses are rigorously deduced from a set of postulates or basic principles, definitions, and rules, in a manner similar to proofs of theorems in plane geometry; or arrived at by the manipulation of a mathematical model according to set rules. There is perhaps not a single experiment in the audio-visual field that could be placed at this extreme. There are, however, some that approach it.

For example, Roshal[5] has reported an experiment on the acquisition of skills in tying knots by naval recruits in which four hypotheses concerning the effects of certain film variables on rate of learning were deduced from Hull's theory of learning. All but one came out as predicted, and it was not as predicted because of technical difficult in producing a version of the film that was demanded by the theory. Here is an instance in which a theory told an experimenter how to construct a film that would yield good learning of a particular task by a given audience.

Sheffield[6] has formulated a theory of perceptual learning based on the principle of contiguity which is the central principle in Guthrie's theory of learning. From this theory he derived several hypotheses concerning the structure of films, their utilization for learning tasks of mechanical assembly of parts of a machine. This type of learning task belongs in the category of serial or sequential verbal learning, but has certain properties that are different from the task of memorizing a poem, or list of nonsense syllables. He predicted that demonstrations of the assembly of parts, which are practiced before the next part is shown, would under certain specific conditions result in faster learning than demonstrations of the entire assembly at one time followed by practice periods. These predictions were verified by experiments.

Several years ago I proposed a theory of learning a skill from a demonstration.[3] It is based on the Miller and Dollard theory of learning by imitation. Some of the rules for production and utilization deduced from this theory are very similar to those that Sheffield deduced from a Guthrie-type theory of perceptual learning and Roshal from Hullian theory.

An example of a production rule that has been derived from each of the above theories is that in filming a demonstration, the camera should be placed to show the task as the demonstrator sees it, and as the learner will see it when he tries. This is called the "subjective camera angle."

Another principle is that if the number of movements or responses required to perform the task exceed the memory span or perception span of the learner, the demonstration should be broken into discrete parts, and if possible into "natural units".[7]

These are only a few instances in which hypotheses to be tested by experiments have been derived logically from a theory of learning. At the other extreme the experiment is prompted either by sheer curiosity or in some instances by accident. For example in one of our experiments at Yale we compared a very rough version of a film, technically called a "pencil-test-running reel," with the finished product which was produced in color.[3] This crude version was first used for the purpose of trying out procedures and test questions to be used later with the finished version. Having obtained results we compared them later with results from the finished product, and found to our surprise that they were about the same. We ran the experiment again under more controlled conditions and obtained about the same result. Here is at least one instance in which learning theory had almost nothing to do with the decision to make the experiment.

In between the two extremes illustrated above are the great bulk of experiments. In some cases the ideas or hypotheses were suggested by the results of previous experiments; in other cases they were derived from hunches and guesses as to the probable influence of some variable on the learning task. The extent to which learning theory relevant to the learning task has been used may be judged in part by the number of experiments which have shown no significant differences between experimental and control groups, between results obtained from different versions of a film, and different utilization procedures.

If someone would take the time to go over the experimental literature in this field and count up the number of experiments in which the results were negative--not as expected--and compare them with those that yielded position results, some interesting correlations might be discovered. One might predict that experiments based on hypotheses deduced logically from certain basic principles of learning, and which were well designed and executed would tend to rank high in respect to positive results. A formula for positive results might be--hypotheses logically derived from a learning theory, good experimental design, adequate experimental materials and controls, and valid technique for measurement of results.

Going back once more, roles of theory in the advancement of knowledge it was said that a theory often serves to bring diverse phenomena under one general principle. To what extent has learning theories accomplished this in the field of learning from films? Neal Miller[4] has made a significant contribution here. He has indicated how a great many of the diverse conditions on which learning from films depend may be shown to be instances of one or more of the well-known four principles of learning-DRIVE, CUE, RESPONSE, and REWARD. Stated broadly, and rather loosely, these principles assert the basic conditions most favorable to learning are that-(1) the learner must want something-MOTIVATION; (2) must notice something-CUE; (3) must do something-RESPONSE; and (4) must get something-REWARD.

He has outlined 13 hypotheses concerning how motives and attitudes might be changed by the use of appropriate films. He has also shown how the principles of cues may be used in relation to how pictures are perceived, physical conditions of viewing, focussing attention on relevant cues, teaching better discrimination between cues, and the use of animation in films. He has also indicated the kinds of responses that a learner may be making while viewing a film, and how these responses get reinforced. These four basic principles have been not only suggestive of a number of specific hypotheses concerning the conditions on which effective learning from films depend, but also have served as focal points of a great number of independent variables.

A fourth role of theory, mentioned earlier, is that of suggesting new techniques of observation, measurement, and experimentation.

From a theory of perception Sheffield[7] predicted that learning to assemble a complex piece of apparatus would be facilitated if the learner could see each of the pieces pop into place in a correct order without showing the movement of hands putting them into place. This suggested the use of a well-known motion picture technique of showing objects that have no internal power of motion moving about as they were animate beings. Sheffield has called the technique of "implosion" the opposite of "explosion."

Limitations on the Use of Learning Theories

In order to use any theory for prediction it is necessary to comply with all of the conditions specified by the theory. The law of free falling bodies holds only for bodies falling in a perfect vacuum. Webber's law in psychophysics holds only in the middle ranges of stimulus intensities. In order to use the Miller-Dollard four principles of DRIVE, CUE, RESPONSE, and REWARD to predict the influence of color, for example, on learning from a film, it must be known in advance what color adds or subtracts from the drive and cue values of stimuli; what kinds of responses are most likely to be already conditioned to colors, and the reward or reinforcing values of color stimuli. Our present stage of knowledge gives us only a few relevant facts about the role of colored pictures. First, people in our society tend to prefer to look at colored pictures as against b. and w. versions of the same scene; second, for some learning tasks color is valuable for cue discrimination; (as for example in learning to identify birds of different color); third, persons who have seen and enjoyed many entertainment films in color have acquired relaxing responses to color cues. Very little is known about the motivating effects of color, or about its reward values for reinforcing responses made to films. It is due mainly to this lack of relevant knowledge that we are unable to make full use of three out of the four of these principles to predict the effects of color on learning from an instructional film.

There are other practical limitations. A color version of the desired film may not be available. Classroom conditions under which color might be predicted to add to motivation may be difficult or impossible to obtain.

Another limitation on the use of learning theory to predict the effects on learning tasks of several possible independent variables, is that many instructional and training films involved two or more forms of learning which depend on different sets of conditions. Most theories of learning have been derived from relatively few forms of very simple learning tasks and generalized to wider ranges of tasks. For example, Hull's theory was derived mostly from experiments on classical and instrumental conditioning; Gestalt's theory was derived mainly from experiments on perception.

Several forms of learning are recognized by psychologists. Among them are: (1) Conditioning by which associations are formed between stimuli and responses. When applied in verbal learning the associations may be between words, or between words and objects. Examples are learning facts which involve associations between places, dates and events; learning the vocabulary of a foreign language; learning the names of objects, learning tables of addition, subtraction, multiplication and division in arithmetic, and so on.

(2) Serial learning. Examples are learning to count, learning the letters of the alphabet in order, learning the days of the week, months of the year, names of the Presidents of the U.S.; learning to spell, memorizing a poem, and the acquisition of some skills. In all cases the task is to learn an ordered sequence of responses.

(3) Concept formation. This form of learning is based on an interaction between generalization and discrimination. For example, a child learns that a cat is a four-legged animal (generalization) but has characteristics that distinguish it from all other four-legged animals. This type of learning is usually tested by asking for definitions, examples of, instances of, illustrations of; or vice versa by giving the example or instances and asking for the concept.

(4) Perception and understanding. Perceptual learning is the form by which meaning is acquired. Comprehension or understanding is the organization of concepts into larger meaningful units. This form of learning is sometimes called relational learning of what leads to what; or insightful learning.

(5) Generalizations. Learning to draw warranted conclusions from a given set of facts and learning to withhold judgment or a decision until more facts are in, is a proficiency much to be sought.

Although there may be a few general principles and conditions that apply to all of these forms of learning. Experiments indicate, however, certain conditions that are fairly unique to each form. For example, learning by parts is more effective for some forms, whereas for other forms learning by wholes is the best procedure.

When it comes to learning from films, many of the learning tasks may involve two or more of the recognized forms. When this is the case the film structure and method of utilization may favor one form but not the others. Therefore, in order to predict from a theory the conditions most favorable to the accomplishment of the learning task, it is necessary to analyze the task into the various forms of learning that are involved.

At this point I would hazard a guess that if a study were made of experiments in which the outcomes were best predicted from theory it will be found that in about every case the learning task conformed fairly well to one of the recognized forms of learning. For example, I am of the impression that predictions concerning the conditions that are most favorable for the acquisition of skills from training films have been more accurate than those from instructional films, for the simple reason that the form of learning from training films is quite similar to that of verbal serial learning.

A third limitation on the use of learning theory in AV is due to the fact that we are not always able to measure all of the learning that may result from a teaching film. Although great progress has been made in the construction of tests and in testing procedures, yet it is doubtful if all of the forms of learning that may result from a film can be measured adequately, and reliably. This is particularly true of perceptual learning, comprehension, and changes in attitudes. There is evidence that certain inner changes may be produced by the film experience that do not manifest themselves by changes in behavior until a particular situation occurs which may be quite different from the film test situation. This "sleeper" effect has been observed in experiments on attitude change. Another effect difficult to measure, but of great educational importance is the "learning to learn" effect.

The Influence of Audio-Visual Research on Learning Theory

When an experiment fails to yield the predicted or expected results, the experimenter is challenged to explain why? Sometimes the experimental conditions were unfavorable and unavoidable, or the measuring technique inadequate, or the hypothesis did not follow logically from the theoretical considerations, or the theory was faulty. This could lead to further experimentation in which the supposed defects are corrected. If on the other hand the results are positive, the experimenter's faith in the principles which suggested the hypotheses or from which they were deduced, is strengthened. Thus research on learning from films can contribute to learning theory first by presenting results which challenge existing theories to explain, and second by results that tend to reinforce a particular theory or strengthen faith in it.

One of the greatest challenges to learning theories is to explain how it happens that by watching a demonstration and listening to verbal commentary on it, pupils can learn to perform this sequence of responses, without having practiced or tried even once.

What is it that goes on inside the head, and the rest of the body, of the learner that produces the observed changes in behavior that are revealed by gains on test performances of various kinds? Several suggestions have been made as to what could be happening:

(1) In the case of training films the learner could be engaging in something called "skull practice" or more specifically he could be making incipient motor responses which could constitute a minimal motor practice of the correct sequences of responses.

(2) The learner could be acquiring sequences of visual, auditory, and kinesthetic images which he remembers and from which he can read off the correct answers in the test situation.

(3) He may be acquiring what Tolman has called a "cognitive map" of the content of the film from which can later be read the correct answers to questions or show improvement in some motor performance.

(4) He may be connecting the cues presented by the film to a sequence of perceptual responses ("What is it" responses) which produce inner cues that are already connected with the responses required by the test situation.

(5) He may be silently verbalizing some parts of the visual content. If these verbalizations are correct and if he can remember them, they will serve as directions for motor responses in the test situation, or suggest correct answers to test questions.

(6) The cues presented by films may evoke a variety of physiological reactions, such as increases or decreases in the secretions of glands, changes in heart rate and blood pressure, changes in brain waves and so on.

This incomplete list will suffice to illustrate the basic problem of developing a useful theory of learning from films. These inner changes, on which learning from films is believed to depend are not visible to the naked eye of the investigator. Some may be recorded, however, with proper instruments. They have the status of "intervening variables." They stand between the observable and manageable independent variables on the one hand and the observed changes in response to test situations.

What an individual learns from a film, how much and how well, depends mainly on the kinds of response he is making while viewing the film. For an independent variable such as we have been discussing to affect learning from a film it must somehow operate on the responses that are being made while seeing the film, or on some other essential condition of learning, such as, the learning set created by pre-film introduction, the participation during the showing, or the inner response made to post-film instruction.

A theory of learning from films is therefore, a set of statements about the nature of the foregoing types of unobservable responses that are being made during the learning session, and how they are related to observable and manageable independent experiment variables such as listed above, on the one hand; and how they operate to produce changes in test performance on the other. From this point of view the essential conditions on which learning from films depend are variables that intervene between independent experimental variables on the one hand and the dependent or learning results variables on the other.

The main differences between modern theories of learning are in the conceptions of the nature of these intervening variables, and the laws by which they are anchored fore and aft to independent experiment variables, and dependent behavior variables; i.e., between antecedent and consequent conditions. This is not the time or place to describe these theories. It is sufficient to say that theorists which consider these variables as responses of perceiving, thinking, feeling, imaging and verbalizing, and which have cue value, or the capacity to evoke further responses, are the ones which hold greatest promise for advancing knowledge concerning learning from films. The sequences of events may be indicated as follows:

External stimuli and other antecedent conditions → inner responses with cue value → overt responses verbal and non-verbal. The arrows represent functional relations which are often stated as the basic principles or laws of learning. They are the points at which learning occurs.

Learning from films is believed to occur mainly at the point of the first arrow. What is actually learned is the kinds of inner verbal, imaginal, perceptual, or implicit motor responses which, because of previous learning, are already cued to the types of overt responses required by the test situation. For example, if the inner responses are verbal and the learner formulates in his mind answers to questions, or verbal directives for a manual performance, it is assumed that he has already learned how to make his hands follow these directions when he takes the test. This, of course, is not always true. Very few people can wiggle their ears in response to a verbal command. It is highly unlikely that any one could learn to wiggle his ears by viewing demonstrations of ear wiggling on a motion picture screen. Perceptual learning occurs which cannot be executed because the cues that are learned have not been connected with the motor responses.

This brings us to the crucial problem of learning from films. It is how to construct and utilize films so that they will elicit the kinds of inner responses that are already cued to the kinds of overt responses that are required by the test situation. Much more research should be directed toward the discovery of the nature and laws of the inner process and how they become modified by experience.

Sources of Learning Tasks

The tasks to be learned from most of the films used in experimental research come mainly, but not entirely, from sources outside of the laboratory. Research financed by the Navy, Air Force, and Army has been mainly on learning tasks relevant to the training of recruits and technicians. Instructional films produced for use in schools present learning tasks that are within the scope of the curriculum, or the extra-curriculum. In both of these cases the learning tasks are those believed to have certain benefits to the learner. They have educational value.

The learning theorist, however, may devise certain tasks such as memorizing nonsense syllables which add little or nothing to the education of the subjects but which may add a great deal to the understanding of the learning process. Here the benefits accrue mainly to science. The value to society depends on the values that the science has or may have to society.

Learning theorists are concerned mainly with *how* we learn and not with *what* learning is most desirable for the individual and society. Personality theorists, however, *are* interested in what individuals learn.

Learning theory is a part of personality development and adjustment theory, and this is a part of educational theory. An important part of educational theory is value theory. Except for those tasks devised by psychologists for learning experiments, all learning tasks are derived in one way or another from the system of values that is commonly accepted by a society. It is deemed good to learn some things, and bad not to learn them, and vice versa for other things. Learning theory is most valuable to education by specifying the conditions that are most favorable to the learning of desirable tasks; and the conditions most favorable to the prevention of undesirable learning. Some entertainment films and TV programs have been condemned because they are believed to foster undesirable learning.

The advancement of education by the use of films, TV, and other media of graphic communications requires the coordinated efforts of several kinds of experts. First are those who have the responsibility of determining what shall be taught in schools, in the armed services, and in other institutions. Second are those who produce the teaching materials. Most teaching films for schools are produced by movie-makers in cooperation with textbook writers and curriculum makers. It is here that the learning theorist should have a more important role.

Even though our present theories of learning from films are still in formative stages, enough principles of film construction are known to enable learning theorists to build teaching films that would be more effective than those now commercially produced.

The subject-matter specialist should define the learning task or tasks to be taught by the film, and supply the film content in the form of an outline, but in consultation with the theorist as to the amount of content that should be packed into a film for the most effective learning.

The learning expert should then work with the motion picture technicians on devising the visual sequences, and the narration. Given the learning tasks, the content to be learned, and the age or grade level of the audiences for whom it is intended, the learning expert should be in charge of the production of the film-not the movie maker. All the artistry that is needed for instructional and training films can be supplied by a good photographer. Experiments have clearly shown that slickness of production and tricky optical effects add little or nothing to the effectiveness of such films. The skills required for the production of effective teaching films are quite different from those that have been developed in the production of entertainment films and TV programs.

The third party in this total educative process is, of course, the consumer-the teacher and the pupils. A great deal has been said about the lag between research and teaching. Teachers' lack of understanding of the principles of learning has been deplored. This gap can be most effectively bridged by constructing films and other teaching materials according to established principles of and conditions of learning. Herein lies a major opportunity and a responsibility for the learning theorist.

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Dr. de Kieffer:

Are there questions anyone would like to direct to Dr. May?

Question:

What should the researcher do when several different theories predict different results:

Dr. May:

The learning theorists constantly run into this problem. However, the theory which will predict best results honestly, might be considered as the better theory.

Question:

Do you find that association learning is better than all of the others as far as experimental results are concerned?

Dr. May:

The only experiments with which I am familiar, where a particular form of learning has been singled out are those training film projects which deal with serial learning. The subjects must deal with problems in order. In these cases very good learning results. We can make good predictions on this type of learning because we are dealing with only one form of learning.

Dr. de Kieffer:

Our second presentation, in answer to the question, "What are the learning problems," will be given by Dr. Ernest Melby, who will discuss "New Directions in Education."

Dr. Melby, currently a distinguished Professor of Education at Michigan State has spent his life in education as a teacher, professor, dean and university president. His speeches and writings have made him a well-known forefront thinker and scholar in American Education.

Dr. Melby:

It is difficult at present to select the standpoint from which to discuss new directions in education. The numerous forces playing upon education, the wide-spread criticism education is receiving, the difficulty of financing even our current inadequate efforts, the indifference of the American public to our larger educational challenges, the low priority given to education in our legislative bodies, state and national--all these are enough to make the task of maintaining even current educational directions and programs formidable indeed. But when in addition we face America's problems in world affairs as well as our unsolved problems at home-- all of which we glibly hope to solve through education--the task of appraisal and redirection goes beyond what would normally be assayed by a modest person. I know that a great many of you feel as I do that the current challenges in education are well nigh overwhelming. Yet somehow we must meet them, for failure to do so will mean the decline of freedom and the triumph of statism. Besides if we could only see them--we in education have not only many allies but several events have played into our hands. I refer of course to the inspirational impact of world challenges themselves, to the new automation devices that can give education greater effectiveness and to this country's great prosperity and economic power which could give us any educational program demanded.

But neither the challenges nor the presently unused resources will avail us much unless we act soon and with greater vigor than usual. First we must face realistically the gross inadequacy of our present education. We need a great education, and in relation to the task, we have a minor effort. We need an education powerful enough to be the driving force in our society, one which mobilizes all our resources, an education so exciting to give and receive that it would attract the ablest people in our society. Such an education would cost many times what our present inadequate effort costs. It would involve some sacrifice on the part of all of us but the returns would be incalculable not only in wealth produced but in what is more important--the moral and spiritual growth of our nation--a growth without which we cannot survive as a free people.

Education Our First Line of Defense

Thus, the first new direction we must take is to make up our minds that education is our first line of defense, the major instrument of our national development and our primary means for solving the problems we face--in short the first concern of our people. Don't tell me it already is our first concern. People pay for what they want and when they are unwilling to pay it means they do not want. As educators we have made too many easy assumptions about America's faith in education. Even when bond issues fail and legislatures cut educational appropriations we seem unable to comprehend the plain fact that the American people are not excited about education. They want it as a road to economic and social advancement for their children but they have no real idea of what kind of an educational program we need to make it possible for us to win the world struggle for freedom. They do not see its role in national defense. Above all they do not want a program that costs any more than the present one. They think teachers are underpaid but do not see them as really important people in our society and do not want their sons to be teachers, (only 8 per cent of the people indicate they want their sons to be teachers).

Clearly we face a tremendous task in changing the climate of American opinion so as to make education the central concern of our people. This task will call for vigorous and skillful leadership by all members of the educational profession and the most careful mobilization of lay resources.

A New Emphasis on Values

The degree to which we in America have lost sight of our original value orientation is frightening and sickening. The Van Doren incident, the fact that those who promoted fixed shows and countinanced payola not only go unscathed but are honored by dinners and viewed as great leaders in our society, should tell us something about the growth of materialism and our foggy standards of right and justice. There are many observers who feel we have already sunk so low in ethical compromise we are beyond the point of return. I do not share this view. But if I can judge from the attitudes of the students with whom I work I would say we have a very heavy responsibility ahead if we are to alter the current value system. Yet we must undertake it if our free society is to survive and go on to reach its full potential.

In mapping a new direction it appears to me that two recent academic conditions have begun to pay off heavily in lowering the standards of value with which the student leaves college. One is the concept of value free science, the other is the high level of specialization and emphasis on research which characterizes the preparation of college faculty members. If the professor evidences no convictions why should we expect students to develop any? If the professor is merely interested in data gathering in narrow areas without human concern (and many exhibit this behavior) why expect the student to be a broadly cultivated human person?

There will be no real change in the value impact of the college until we alter the preparation of the college teacher. Contrary to the views of some such a change would raise and not lower graduate school standards when it comes to teacher preparation. If we could raise up a generation of broadly cultivated men and women with a truely liberal educational outlook--with a true humanity based on both inquiry and the conviction that comes from broad scholarship we would be taking a new direction of far reaching if not revolutionary nature. Perhaps some of the smaller and new graduate schools can lead the way in this vital area.

A New Way to Relate Education to Society

One might speak of our present education as a vertical concept. We educate the individual with a succession of levels, primary, elementary, secondary and college. Upon leaving formal school it has been assumed the individual would move into society and by means of his better education help to change this society. But in a society which changes as rapidly as ours, this assumption is no longer valid. While the student is getting his formal schooling the world is changing as much as it once did in centuries. Clearly the vertical concept is no longer valid. A horizontal one is dictated. This means we must educate the whole society at once and continuously.

Such a concept of education would revolutionize our current notions of education. If might well double the number of people in educational work, quadruple the number of books sold, astronomically increase the circulation of magazines and fundamentally change the value outlook of the American people.

Building such a horizontal program of education will confront us with a whole congery of new problems in educational logistics. It will demand new qualifications for teachers and give lay citizens new educational responsibilities which will simultaneously create new educational opportunities for them.

Such a program of universal and continuous education would give new impetus to educational research, multiply the number of audio-visual devices and provide a new role for television. It would create a new intelligentsia--a democratic intelligentsia which would inevitably give a new quality to American life.

A New Curriculum

We are living in a new world, one that people of my generation did not even dream of when we were college students. Yet very little change has taken place in what people learn in school. Even though there has been an explosion of knowledge it has affected the school but little except to load the curriculum with impossible burdens of often meaningless knowledge. Science has revolutionized our world but our school and college graduates have little conception of the meaning of science. Geography and history are centered in the continental U.S.A. and Western Europe, even though we should know that the great stages for the human drama in the last half of the 20th century are in Asia, Africa and South America. What is equally important we need a new attitude towards the dark skinned people in those areas as well as a new human relations attitude at home. The acquisitions of these changed human relations attitudes are more important to our national survival as a free people than all our missiles and vaunted military strength.

If freedom is to live and develop further we must establish new criteria for the effectiveness of education. In the past we have asked the student, "what do you know?" but in the future we must ask "what are you" what are you in process of becoming? How do you behave? What is your sense of responsibility? When we determine a curriculum to help students to answer these questions it will be a different program than when the final question to be asked is "what do you know?"

The Automation Revolution in Education

There is little question we are on the verge of an automation break-through in the field of education. The air bomb classroom, the "teaching" machine, the inquiry into the nature of the communication process--these and other developments present us at one and the same time with new possibilities and new dangers. Erich Fromm has pointed out that our technological society has made machines into men and men into machines. In industry the machine has taken over. It is what machines can do rather than what men should do that controls the decisions made. Close students of the impact of technological civilization on the human being fear that man's feeling of significance in work is being lost, that our youth especially see little importance in the tasks they perform. They see in all this a withering of man's creative imagination as well as an explanation for juvenile delinquency and lowered public morality.

Education should surely be one of the few remaining tasks that are intrinsically significant--work in which there is free play for imagination and creative capacity. How will we employ the new devices? Will they be used to supply new dimensions? Will they raise the sights of teachers and students? Will they bring creative spirits into contact with more children, youth and adults? If they do all these things then we can look eagerly to educational automation. But what if the machines control the curriculum, set up patterns which all teachers seek to copy because of the glamour of the machine and the TV teacher? Who will "program" these devices? Will there be any adaptation to the capacities of children? What good will it do to look forward to the day when the teacher is a master teacher--a curriculum student, a student of child development if those who "program" the machines make all the decisions? And will the machines catapult us back to the days of subject matter dominated education?

For one I am deeply troubled by all these questions. So far the machines are the brain children of the technologists and the audio-visual group in our profession, when will the administrators, the supervisors, curriculum students and child development students begin seriously to work with these devices? We are the most gadget-minded people on earth. These devices will have a magical appeal--spurred by manufacturers and eagerly fastened upon by the money savers who are ever with us. Who will save the children? Or will they be seen as expendible--as pliable servants to machines? If so, how will our education be really different from the Soviet pattern?

Education For Imagination

Perhaps I would not be quite as concerned over the possible impact of the "machine" on education were I not so dissatisfied with the outcomes of our present education in the area of imagination. It is my impression that the increase of factual-emperical knowledge with high level specialization has exercised a deadening effect on our education in the area of imagination. Our verbal insistence on original research for the doctorate, our reluctance to accept philosophical dissertations, our relegation of anything creative to a lower level of academic respectability, the worship of science--of objectivity (even in areas in which it has limited application), a teacher education stressing the science rather than the art of teaching--these and other factors have combined to produce a pedantic school--a school which values the doer and makes light of the dreamer, a school which rewards conformity and complete recall in memory. The students are so smart--they know so many answers but they come up with so few original ideas. So few of them are outstandingly liberal in social outlook. They seek orthodoxy and security.

Our society--our education made them this way. They are the educational products of two decades of educational history during which American education was afraid of its own orientation--during which we too often could not make up our minds--a period in which we sought to be modern without being progressive, advocates of science without behaving scientifically.

To educate for imagination we must apply imagination to education. Mr. Phillip Combs says we should have a vice president for heresy. But every president, every vice president, every administrator should feel a commitment to nourish heresy. The trouble is we don't like heretics in our current American mood. We have fought the Russian heresy so hard we now tend to fight all new ideas even those resting on scientific data and nurtured by our own tradition.

Education for Greater Humanity

Our current human relations problems set over against our talk about education make a strange concatenation of high aspiration, terrifying problems and confused thinking. In theory we abhor racial discrimination. We are told about the centrality of our racial shortcomings in world affairs. We talk much about education for good human relations. But we have little intention of practicing what we preach. Many even think we can teach good human relations in segregated schools. And in spite of all the evidence to the contrary we think if people know they should not discriminate against others because of race they will act on their knowledge. Nothing could be further from the truth. On top of it all we fail to see that our interpersonal relations, as well as our relations between teachers and pupils and administrators and teachers are part of the human relations picture. All this leads to a situation in which we can all talk well, act in specialized knowledge areas but do little to alter the status quo. That some people like this situation goes without saying but the total results are meagre indeed.

Here we are close to the area of imagination--so close in fact that the two cannot be separated. No one can measure or even comprehend the creative loss which comes from human relations lacking in creative impact. Think of all the pupils whose creativity is limited by unsympathetic teachers, all the teachers who are less creative than they could be because their supervisors lack human warmth, sympathy and understanding, and finally the number of white people whose souls are corroded by racial animosity! Here we have the greatest human waste of our day. Yet nearly a half century of teaching experiences has told me how hard it is to convince people that creative human relations are the key to creative education. Unfortunately it is often true that the higher the intelligence level and attainment of educators the less patience they have with human relations problems. They persist in believing that knowledge is the answer and they live out their lives in constant disappointment with the response of others--not aware it is their own selves who are largely to blame.

If I could name only a single new needed direction in education it would be for a renewed emphasis on man's humanity--on the sacredness of individual human beings and on the centrality of living creatively both with individuals and groups if a creative education is to result.

A Look Ahead in Research

The paltry funds and scattered energies we devote to educational research are one measure of the small value we attach both to education and to new ideas for education. But I suspect that even the little we put into educational research loses much of its return because we do not ask the right questions and because we paint on too small a canvas. We have been traditionally pre-occupied with the question "How do people learn?" We have not as often asked "Why they learn?" or "What they should learn?". Nor have we asked "What does it mean to learn?"

We know very little about what is taught out of school by homes, communities and mass media. One suspects that we spend money publicly to teach honesty and spend it privately to teach dishonesty, that we spend it publicly to teach thrift and conservation and privately to teach waste and contrived obsolescence. We are at war within ourselves both as persons and collectively as a nation.

If these issues are to be faced through research we must draw heavily on the social scientists. Perhaps our future success depends on our ability to convince the social scientists that our problems are their problems--that education is the growing edge in all the human sciences. Thus the final new direction in education I wish to suggest is that we come finally to see that education is not a mere accessory to a free society but its major instrumentality for progress.

In seeking new directions for education in the last four decades of the twentieth century we can make many errors. We can easily fix our attention and efforts on the how to do it phases when we should be concerned with what, and why, and how much. We shall face our persistent tendency to elevate subject matter and subordinate the teacher, to emphasize knowledge and overlook attitude, to look for shortcuts and breakthroughs in areas where only hard creative work can give us the education we need.

To many, the points I am making will be depressing. The subject matter researcher would like a world in which children and youth learn without help, freeing him for full time on research. The big taxpayer would like mass methods of education through television or films for huge classes. Educational administrators and many teachers hope for curricular changes which make creative human relations unnecessary. But to all these we must reply that teaching is an art and machines will not replace teachers any more than machines will paint pictures or compose symphonies. Machines may help but the degree to which they help will depend on the creativity of the teacher. The time will never come when creative living with students ceases to be the essence of education. On the contrary the more we learn about education the more important the teacher becomes.

Dr. de Kieffer:

Are there any questions which you would like to direct to Dr. Melby?

Question:

How can we communicate, what you have just said, to our legislators? They control the funding for public education.

Dr. Melby:

I have no solution to this problem, however, in our state of Michigan, educational leaders, such as Paul Hanna, have gone to the legislature for the past twenty years and have come home with the bacon. For the past three years, the piece of bacon, unfortunately, has gotten smaller. The plain truth of the matter is that with the growing complexity of our society, no one can go to the legislature and, in a few days, do the job that should be done. We need grassroot organizations all over these United States to help with this problem because the legislators are responsible to the people. This we have not done to date. We have not carried the problem of higher education to the people of our states. The people do not understand the problem and do not realize its importance. Unless we organize a grassroot system, the most powerful university presidents in our country will be unable to achieve the task ahead.

Question:

You mentioned that we could learn from newer media but the costs would be greater. Do you believe that the learning would be great enough to offset these increased costs?

Dr. Melby:

I am positive that there will be greatly increased returns if we use these devices to take care of many of the problems of education. They would multiply the time teachers could give to individual students. In my estimation, this would provide better education for the children of America.

Dr. de Kieffer:

This morning we started out with the larger gestalt; we found answers to the question, "What are the Learning Problems?". This afternoon we begin to narrow our thinking to the role of education. Our question, therefore, is "What Are The Implications of Learning Problems to the Role of Education?" Our first catalyst, Dr. Walter K. Beggs, will discuss the subject, "The Implications as They Relate to Teachers and Teaching".

Dr. Beggs, a native of Iowa is currently the Dean of the University of Nebraska's Teachers College. Prior to becoming dean in 1958, he was the director of an exhaustive study of small community life financed by the Carnegie Corp. His intimate knowledge and experience in all phases of public education has made him keenly aware of the relationship between the school and the community.

Dr. Walter K. Beggs:

Educators in the United States are going to have to spend some time listening to people in our society who are in the predicting business. Obviously, we do not have time here to consider this fascinating science at any length. However, we should note that it has progressed far beyond the guessing stage to the point where the trends that are pointed out to us are worthy of our careful attention. It occurs to me, for example, that teachers in the elementary schools today are working with youngsters who will reach their 100th birthday with all of their facilities intact and in good health. Between now and the time these students reach their century mark they are going to see some changes in this civilization which are probably beyond even the dreams of their elders. If you don't believe this, all you have to do is to go back to the beginning of your own life and think for a moment about what has happened from the time you were born until the present. I wonder what my grandfather, who was a farmer in Iowa 75 years ago, would have thought if someone had told him that his grandson would in 1960 board an airplane at a place called La Guardia Field in New York at eight o'clock in the morning and be home in Lincoln, Nebraska, 1500 miles away by mid-afternoon on the same day. Or what would grandfather have thought if someone had predicted that this same grandson would be able to sit in his own living room on a Sunday afternoon and watch a ballgame played in New York City and see it better than if he were in the stands at Yankee Stadium. You and I know that both of these phenomena are possible but the changes have come so gradually in our own lives that we have not realized the tremendous cultural impact and the adjustment that has been necessary to them.

I am tempted to explore the changes of the past at considerable length. But, while this would be a fascinating digression, we would gain nothing particular from it. Of much more significance are the channels of change which are running through our society presently, to which we must continually adjust our educational programs. Four such channels are in evidence. First, is the acceleration of pace in our society and the increasing mobility of the population. On the trip out yesterday we passed a series of historical markers between Lincoln and Hastings which traced the old Oregon trail. In 1850 according to one of these signs 4000 wagons passed this given point on their way to California. In our drive we covered a distance in eight hours that would have taken those wagons three months to travel 100 years ago. It is possible and even probable that the acceleration our children will experience in the coming years will be as great by comparison. Now this is bound to have implications for our program planning. It is not necessary for me to spell out the details in any great degree. You can do that as well as I can, but suppose we project our imaginations for a moment. It is conceivable that a person could live in Boulder and commute to work in Chicago or on the west coast or in New York City. It is also conceivable that a family might live on the west coast for a few months out of each year, move to Florida for another month or two and spend the rest of the year in New England. I do not imply that these specific events will occur, but it is possible, with the acceleration in transportation and communication that this type of mobility could develop. As a matter of fact, we are already facing some problems of this nature. The mobility of our laboring force is a case in point. Dr. Robert Lantz who, for a time, was Superintendent of Schools at Corcoran, California, in the irrigated cotton district, tells of starting in the fall with some 1500 students. By November 1st the enrollment would increase to 2500 as the migrant workers moved in, and then fall back to roughly 1500 again by March 1st. It was necessary for him to provide some 30 mobile classrooms that could be moved over the district with tractors in order to meet the needs of these students. Obviously, all of this means flexibility of program, flexibility of plant, flexibility of teaching methods and flexibility in accounting procedures for students. In fact, it should mean, if I assess the situation correctly, that the total educational program will have to assume a degree of flexibility which is unknown to us now, and we will have to solve problems, as a result that will stretch our inventiveness and our imagination to the limit.

The second channel that runs through our culture is one which we might call expansion. Here we have a somewhat different problem facing us. I am told by people who ought to know, that new knowledge is being added to our current store at a fantastic rate. In fact, as of now it is doubling approximately every ten years and the rate is accelerating so rapidly that within a brief span it will double every five years. I don't believe that anyone has ever taken the trouble to figure out what this means, in terms of how we plan our programs of formal education alone, much less what it means in the informal areas of education. How can we incorporate all the new material into our curriculums so that it can be meaningful and learnable to the youngsters? And also, how can we keep their parents and the adults around them adjusted to what is happening in the educational program.

But, not only is the horizon of knowledge expanding, the actual geographic horizon is expanding too. We are told that sometime within the next few years, one of the astronauts will go into orbit above the atmosphere of the earth. No one knows what this chap will see in the great space out beyond the blinding influence of the atmosphere but I am told it will look different. We have to assume, of course, that this man will come back and tell us what he sees. And then, following him will be others, not simply orbiting the earth but moving out to the moon, and to Mars and to Venus. I certainly am not optimistic enough to say that we will one day inhabit these planets but certainly the store of information that the scientists are gaining about the world of space is expanding our whole horizon not only in knowledge but in general concept of the universe; to say nothing of what it is doing to our system of values.

A third element in our pattern of change concerns our relationship with other nations. International competition is nothing new to us. We have always found it necessary to match wits and muscles with other people's, but this has been confined in the main to economic, military and political contention. Now, however, we are finding it necessary to commit our whole cultural complex to a contest of survival. Mr. Krushchev, during his recent visit was entertained at a luncheon, by a group of this nation's leading business men. During the proceedings he said in effect, "You believe in capitalism as the best form of social and political organization. We believe that communism is better. Very well, let's compete. We intend to beat you in every way; economically, educationally, culturally and, if necessary, in war." This was a total challenge, in which the whole giant structure of the Soviet Union was pitted against the equally gigantic enterprize which is the United States of America.

No one really knows what this is going to mean as the contest unfolds. But, of one thing we can be quite certain. The day of leisurely tinkering with our educational processes is over. Unfortunately the first reaction in certain quarters was to demand that we copy the Russians. Since their youth study science a given number of hours per day for a given number of days per year, then we must increase those days and hours for our young people, and see to it that we bring our curriculum in line with theirs.

This seems like utter nonsense to me. Our educational system should reflect the needs of our culture which by definition is different from the Russian plan. If there is no difference, why bother with the competition at all. Why not join them and have done with it?

But, we do have a unique society and a unique school system or so we profess. If true, then we should be prepared to invest our professional lives in its improvement. We should be willing to iron the "bugs" out of our organization, not according to the likes and whims of another country, but according to the needs of our own people.

The fourth channel with which we must be concerned is probably not a separate phenomenon but a composite of the other three. Suppose we call it the shift in emphasis made necessary by the variety of forces inducing the changes we have described. Different analysts approach this problem from a number of angles. Peter Drucker, for example, sees much more government involvement in almost every aspect of our society. Galbraith feels that we must be more concerned with gross production as an index of our wealth than federal budget balancing as the _sine qua non_ of economic health. Gardner wants more attention to excellence in every line of human endeavor. Rickover desires an intellectual elite for national decision making, and almost every pundit scolds us for our material gluttony and our lack of spiritual values.

In fact, we are almost surely in one of the great transition periods of civilized human endeavor where the eventual emphasis and the sure direction of the culture eludes even the most competent observer. However, there are some straws in the wind. We will have to learn to deal with mass and separate atoms at one and the same time. I'm thinking of the trend toward the linear city as opposed to the separate metropolitan unit. Competent observers see a great elongated population mass stretching from Bangor, Maine, to Richmond, Virginia, containing some one hundred million people. Another similar agglomeration is visualized on the west coast from Seattle to San Diego. Others of forty or fifty millions are predicted hinging on Chicago and Atlanta. And, still smaller units are developing all over the country, but each follows the linear pattern.

This is, of course, predicated on a national population of three hundred million or more, but no one seems to doubt that this number of people is within our immediate planning future. Now the tricky policy problem facing our leadership may be posed in the question; can the democratic principles designed for a nation mainly of farmers be redesigned and re-emphasized to fit this new social organization.

Which interests are paramount, those of the whole body politic or the individual, those of locality or region, those of region or nation, or in the final count down, those of the nation or the total world population.

But, we are here for the purpose of looking at certain educational problems. Certainly no one of us would deny that we face the same mass versus atom dilemma in our profession. Do we concern ourselves with teaching the man or the individual? Are we interested in the composite or common needs of all the students or the needs of a given child? Should the educational needs for national survival take priority over the pressing needs of an individual student?

Certainly, these are not idle, nor elementary questions. They are fundamental, and how we seek and find the answers will test the metal of the nation's educators to the very limit.

Three words which are in reality whole areas of policy inquiry are going to be increasingly invading our councils. They are, in no particular order of significance; complexity, flexibility, and diversity, or if you prefer, differentiation.

Harland Cleveland, Dean of the Maxwell School of the Social Sciences at Syracuse University, notes that each of the students is warned upon entrance, "Whatever else you do, learn to fall in love with complexity." This might well be our masthead in education. The human being is a complex organism, the human community is a complex mechanism.

How then, can the process of developing an individual to live in the community, or to regulate the community to absorb the life of an individual be other than highly complicated.

A moment ago we mentioned the need of flexibility in our schools. I don't believe that we have even begun to understand the nature of this necessity, much less the possibilities that are available to us in developing flexible schools and programs. Our educational program must do many, many things for many types of learners. We are criticized for trying to be "all things to all men". To me this is the wrong criticism. To want to meet the needs of many different individuals is a noble desire. We are subject to criticism because we don't know how to do it, and especially when we claim that we are doing it when, in reality, we're falling far short of the goal. Not only programs and schedules, but plant and equipment, teachers and teaching techniques must be developed to be adjustable and sensitive to any and all demands made upon them.

Finally, we have probably just begun to learn about the differences in individual learners. Almost all of our emphasis has been placed on their intellectual differences. We are hearing a great deal these days of a certain top fifteen percent, the so-called gifted group. By tests, and by observing academic progress we can isolate these students. We are told that by establishing special programs for them we can win the race for knowledge. Now, I do not quarrel with this approach for this group. But, winning the race for knowledge is not enough. It is the nation that makes the most efficient use of its total manpower that will win the race for survival. We must develop methods, and techniques and vary the media through which we approach the whole range of learning talent that comes to us to learn.

Today we are geared to the formal classroom. We insist that a class of from 25 to 30 students is the ideal. We approach the learner through the verbal media, and although we vary our techniques, the variation stays almost exclusively within this category.

However, we must explore every device, every media, every teaching aid that might in any way help us open the doors of intellectual endeavor to every type of student we may encounter. For that reason, conferences like this are most significant. Many of the things we need to know are available in the research already done. This is not to say that the research job has been completed--in fact, it is only started--but enough is apparent for us to get on with the job, provided the findings of research are thoroughly disseminated.

Dr. de Kieffer:

Dr. Beggs has identified many problems. Among these are complexity, flexibility, automation, and differentiation. All of these variables have a bearing on teachers and our educational system.

Question:

Dr. Melby said this morning that there is confusion between instruction and teaching. Do you feel that we should instruct the top 15% and teach the rest?

Dr. Beggs:

No, I believe we should teach all of them. My major concern is that we don't push all the children as far as they can go.

Question:

Are you implying that we should keep our school reorganizations to a limit?

Dr. Beggs:

I am not necessarily delimiting reorganization. I believe we will have to find ways by which potential can emerge into leadership rolls regardless of the nature of the group.

Question:

How are the teacher training institutions going to equip teachers for this task?

Dr. Beggs:

I don't know the answer to that question but I do believe we need to start finding out. We are not yet ready to plow up our present organization because we don't know what to put in its place but we must find out and make the adjustments as rapidly as possible.

Question:

I agree that we should push toward getting the lower groups to work at peak efficiency and performance but what suggestions do you have for getting the upper 15% to the peak of their efficiency?

Dr. Beggs:

There are a number of ways currently being tried. One is to segregate these people and treat them as a homogenius group and isolate them from the rest of the group. I do not like this idea myself but I think we ought to find out which is the best way to do it. It may be also, that this gifted group, at least part of the time, can be by themselves, pursuing their own levels of activities. We must take into consideration that there are different kinds of giftedness within a given high school structure or elementary structure and get various kinds of homogenius groups together, but keep them all within the comprehensive organization. I hold no brief for any of the current systems but I do believe one of the greatest jobs we have to do, before we jump to any conclusion, is to find out. Europe has emphasized the top groups for the last 300 years and I don't like the results of what has happened there. There must be a better way to do it and I think we can find it in the American system.

Question:

What has happened in Europe when you have skimmed off the top 15% of the intellectual grouping of a nation?

Dr. Beggs:

A partial answer to your question may be found in the Soviet Union where almost 10% of the intellectual cream was destroyed at the beginning of the revolution. What we see now in Russia is the outcropping of new leadership in a different system. It is giving us fits. Another illustration, is in our own country's history where instead of the top 15% the lower intellectual groups from Europe migrated to America. For example, the convicts which were brought to Georgia, or the dissenters which came to New England. They developed their own leadership. You can see the result of it here in our own nation.

Question:

Should our teachers stop teaching factual information?

Dr. Beggs:

I don't believe we should throw out our total educational system. However, there is much in our teaching that we don't need any longer. For example, in some schools, physics classes are still teaching Newton's law as basic. This approach is quite obsolete, so why should we continue to use it. We are quite inefficient in the transmission of factual information in our schools. It is at this point where the media people have a great contribution to make. Perhpas we should also discard a number of areas now claiming attention in the schools and pursuade other agencies in the community to accept the responsibility for these.

Dr. de Kieffer:

We now come to part II-B of the seminar. In answer to the question "What Are the Implications of Learning Problems to the Role of Education?" we will be discussing the "Implications as They Relate to School Facilities, Classrooms, and Material Centers." These problems will be discussed by Mr. Maurice Mitchell.

As President of Encyclopedia Brittanica Films, Incorporated, Maurice Mitchell has taken a position of active leadership in the field of new techniques in education. In addition to extensive teaching, writing and platform appearances in subjects related to new media of communication in education, he testified in behalf of the audio-visual field before committees of the House and Senate prior to passage of the National Defense Education Act by Congress in 1958.

Mr. Maurice Mitchell:

Continuing research into the learning process has made us increasingly aware of the impressive potentials of some of the more modern techniques of communication. As these devices and techniques are adapted for classroom use and introduced into the instructional materials picture, they pose problems and challenges for all concerned with education.

As we continue to support research into the learning process, it is evident that our knowledge of the use of modern media of communications and other new technologies will increase. This knowledge will move from the laboratory into the classroom at the greatly accelerated pace that characterizes modern society's reaction to innovation - a pace that is unprecedented in education, notably slow in the past to accept radical revision of its procedures.

I make the statement above with more hope than faith. Like many of my colleagues in the field of modern communications in education, I must admit to an extreme dejection at the pace of change - in the face of great amounts of research data and large reserves of usable new materials - during the past few decades.

If the presumption of this conference and others like it is that encouraging further research into the learning process as it is affected by modern communications media will expedite the use of these new media, then I must express my own reservations as to that outcome. There is already a veritable mountain of research available to those who would justify the use of audio-visual instructional materials in the classroom, for example. Another vast storehouse of information has been compiled to document a myriad of techniques for utilization, cataloging of materials and devices for local use.

These studies, energetically pursued for many years by recognized leaders in the field, at institutions of wide recognition here and abroad, have had the effect of breeding more and more studies, but the fact is that it cannot be demonstrated that they have brought about any great and widespread acceptance and use of audio-visual materials and techniques. The audio-visual department and its director (where there is one) are still maintained gingerly, on the fringe, as a sort of secondary frill, by a startlingly large number of school systems. The penetration of films as instructional materials has been particularly scant in the very area which has provided the great body of research data - the universities and teacher training schools.

So one may well ask, at the outset, what further purpose can be served by an additional investment of public funds into still more studies to demonstrate the vital need in the classroom for learning techniques and teaching tools that have already been supported by more research data than would be required by any major industry under similar circumstances.

Perhaps the most useful suggestion might be to attack the problem by assuming that while sufficient data exists, it has not been made easily available to school administrators, member of school boards and others interested in using it. This would indicate the value of a major project designed to collect all the existing research reports, index them, publish them in a single volume or set of volumes, and make these widely available throughout the educational system of this nation. This would at least give us another chance to use the knowledge we have already accumulated.

A further useful effort might be in the direction of a study aimed at ascertaining why the existing body of information and research data has not been used by those who determine such things in our educational process. If studies exist to demonstrate that certain new and widely available materials exist that can make the teaching process more effective, speedier and more economical, then why have they not been an inspiration to more school officials and their lay boards? Do we have a major communications failure in education? Is our research being conducted in a vacuum? Are we all too busy finding new and exciting answers to be bothered applying these findings to the questions themselves? Or, as Dr. Hutchins once complained, are we about to be "drowned in a flood of blab and print?" Perhaps the existing body of data, like our mushrooming knowledge in other technical fields, is already so large as to be unmanageable.

So my first recommendations have a negative flavor. No more research. A re-examination of what we already know, a compilation of this knowledge in easily available and easily understood form, and a study of why we do not use what we already have in the way of knowledge - these would be my first recommendations.

Now I do not wish to be accused of damning further research. If we were making proper use of our modern teaching tools, we would be in great need of a continuing flow of sound research findings leading toward new applications of these materials, new techniques for utilization, etc. But we have not listened to the voices of our researchers, and my plea is that we do so now, and with serious interest, before we encourage them to continue producing masses of data that will lie buried and unknown.

I have not, thus far, dealt with my assingned topic: "Implications as They Relate to School Facilities, Classrooms, and Material Center." It seems to me that one must first acknowledge the fiction that would be involved in such a discussion if it assumed that we are now about to make use of our storehouse of knowledge in support of the use of modern teaching tools. We are not yet at that point, though it does appear that we are now rapidly approaching it.

Still, we are dedicating new school buildings this very week which are totally inadequate as far as the use of modern projected teaching materials is concerned. We are planning to build others that are not one bit better. We continue to maintain thousands of classrooms, without any facility for room-darkening (now as essential as the chalkboard), and in countless others there is no access to projectors, filmstrip projectors, flannelboards, opaque or overhead projectors, tape recorders or any of the many other known and accepted devices. Vast numbers of teachers and students meet and work together each school day with only the most distant and undependable access to films, filmstrips or other study materials of the modern era.

Let us assume, however, what most of us really believe: that somehow, and rather soon, we will begin to make use of our new-found and widely-documented technology in modern instructional materials. What will this do to our facilities at the building level?

First, it is obvious that we are going to have to take control of the design of the schoolhouse away from the architect. He has blundered badly, substituting form for function, and we have already spent millions of dollars remodelling new school buildings to remedy his mistakes and compensate for his self-indulgences.

Our new school buildings will eventually take full advantage of our present knowledge (widely and economically used in industry) of light and temperature-air control. Each classroom will be so constructed as to permit the teacher to create the special light situation that fits her needs at any moment. Here alone is a simple change that will expedite the arrival of modern teaching materials.

The expensive and archaic monstrosity installed in many of our new schoolhouses - the "audio-visual room" - will disappear, along with "auditorium showings of educational movies" for one and all at the same time. Perhaps we will also get rid of the masses of plate glass walls on school buildings - those villains of discomfort that look so good on the architect's drawings and bond prospectuses and look far less attractive when the heat bills and venetian blind charges are tabulated.

In the building facilities of tomorrow we may find the long-awaited instructional materials center - a collection of all the materials, all the teaching tools, all located in the building itself. This is a far cry from today's unrealistic situation, in which books are kept in the building, while films, filmstrips and other materials of potential high-frequency use must be borrowed from distant centers. In many so-called modern systems, the teachers are required to order films in March and April for use in the following school year; in only a few is it possible to consistently procure these materials without prior notice and at the time they are likely to do the most good.

There are no real economics to dispute the logic of centrally located instructional materials centers - preferably in each large school building - where pupils and teachers may have easy access to all the modern and traditional materials of instruction. When you apply real use - the kind of use films and filmstrips would get if available on a "finger-tip" basis - to the cost of these materials, then they become even less expensive, on the basis of circulation and effective audience, than most of the traditional materials we have always kept in our schoolhouses.

While we are sketching the outlines of tomorrow's school buildings in terms of our modern miracles in communication, we must use caution lest we over-adapt to the modern age. It is not always true that a new and modern building automatically provides the solutions to some of our critical teaching problems. Indeed, in some areas we can learn from research that the old classrooms without the co-axial cables and television screens so urgently pleaded for by some special interests have a lot of function and facility left in them. One demonstration of this may be found in the findings now beginning to emerge from the extensive research done in the field of programmed self-instruction - the "teaching machines" as they are often called. These people tell us that the teaching machine not only requires no modern classroom but that it may very well in a real sense negate some of the arguments used for educational television, which some consider to be the very essence of modern technology as applied to our educational problems.

Let us take a moment to think about teaching machines, since this is a good example of research that can be ignored at the expense of genuine economy and effectiveness in the teaching process. The people who have developed the present-day programmed self-instructional projects remind us that the classroom itself, with its combination of students and teacher, is essentially a concession to our crowded modern age, and by no means an ideal environment in which to conduct education.

The experimental psychologist, through whose research we have become increasingly familiar with programmed self-instruction, reminds us that the ideal educational environment is probably found in the tutorial relationship, where a single student is taught by a single tutor. In this circumstance it is reasonable to assume that some very important things take place. The student learns at his own best rate of learning. He knows immediately when he is learning. His teacher feeds him information only at the rate at which he is able to absorb and use it. And his teacher benefits from something we do not now have in the present crowded classroom - the near total attention of his pupil. There are a lot of studies to indicate that a student in the average classroom situation is not likely to give more than 20% of his thinking time to what is going on in that environment, and some people reduce that to as low as 8%.

Now the programmed self-instruction specialist has found a way to create a counterpart of the tutorial situation, using an organized and systematic presentation to the student in one of a variety of forms, some of them using relatively simple machines from which, incidentally, we derive the name "teaching machine." The student works through this body of information at his own pace, is compelled to participate in the learning experience by being required to deal with and answer questions, and the early results from this activity seem to indicate that substantial gains are being made.

My own associates have become increasingly interested in this field, and we are now engaged in a large-scale effort which we expect will lead us to the release within a fairly short time (our present estimate is aimed at the 1961-62 school year) of a complete teaching machine program encompassing the seven most widely studied subjects in the high school and college mathematics curriculum, as well as a number of modern foreign languages.

The people who are doing this work with us prepared a course in beginning high school algebra and tested it during the school year just ended in the Roanoke, Virginia, public schools. The course was administered on teaching machines to an 8th grade class in the Roanoke schools - a group of about 35 students, with I.Q.'s ranging from 88 to 120. The entire group finished the course in less than a semester; some of the students finished far sooner than that; and had it not been for delays in the preparation of the programmed materials, some of the completion times would have fallen short of ten weeks. Now, I am talking about an entire academic year of algebra as it is normally administered to 9th grade students in the high schools. When this group of students was given the World Book achievement test in beginning algebra (and it must be remembered that they were chronologically a year younger than the students who ordinarily take this test and that they were also a year younger in terms of mental age), almost half of them scored in the 9th grade high average group, while the others did as well as their fellow students in the freshman year of high school who took this course over an entire academic year under traditional classroom circumstances.

No single test justifies a massive change in teaching techniques, it is true, but the Roanoke test followed extensive investigation that suggested what the results might be, and the materials that are now being prepared will also be extensively tested, not only in the Roanoke schools but elsewhere around the country.

But the important thing here is simply that out of the research which has led us to the programmed self-instruction technique comes the finding that the ordinary classroom is a perfectly suitable environment for this kind of learning. Perhaps in some cases we would not need the plate glass solariums which architects have persuaded us to build, and it is entirely possible that some classrooms which we now condemn because they are not television oriented and equipped are quite suitable. Indeed, according to the experimental psychologist and his colleagues in the field of teaching machines, if it is true that the classroom situation with its group of students and its teacher is an inefficient one because every student cannot possibly be helped to learn at his own rate and because there is a low level of attention at all times, then it is even more likely to be true that educational television may simply result in electronically expanding this inefficiency. It seems to me that this should have special significance to those who see in educational television a means of imposing a sort of master teacher on even larger groups of students than now sit in the ordinary classroom.

So we see that there are a variety of directions in which one might move, in painting a picture of the classroom and school building and instructional materials center of the future, and these directions can and should be influenced by the research that has been done and is now being done in these fields. The problem is that there seems to be no effective flow of research into the hands of school administrators and thence into some form of action that will take our findings out of the laboratory stage and put them to work solving the problems we now see so clearly. Instead, we keep doing the research over and over again, burying the results in foundation-published pamphlets, doctoral theses and professional journals. It is as though the researchers worked in one world and the classroom teachers and school administrators and school boards lived in another. Until we can find some way to bridge this gap, to re-examine what we should know from the studies we have made so far, and to put this information to work, it seems to me to be something less than wise to recommend that we plunge blindly ahead with even more research. If all our research does is validate or invalidate previous research, it is, as I have said earlier, an activity conducted in a vacuum.

It has become fashionable in recent months to loudly bewail the lack of modern industrial type research in our educational process. People who enjoy this pastime like to remind us that American industry grew to its present greatness at least in part through its willingness to plunge ahead into research of all kinds and to incorporate the findings of that research into the kind of action that produces growth and development. The suggestion is that we have no such research activity in education. But I submit that while this makes a tempting point for a speech in a day when people are getting used to nodding in senseless approval at almost any criticism of our educational process, it is a completely invalid premise. There is more research being done in education than in almost any other field of activity in our society today. We have not yet learned to identify all of it as research, and we have made only the most primitive efforts to incorporate our research findings into the body of activity that takes place in education. Until we do this, until we have found a way to convert this knowledge into action, it seems to me to be uneconomical and inefficient to continue pumping our limited resources into more studies and more investigations and more projects.

I have already said that there will always be a continuing need for research in the field of transmitting knowledge and developing the capacity of a human being to think and act, but this simply means that the pressure on us to find a way to convert our frozen assets into working tools grows greater all the time. Let our first research, then, lead us into an understanding of why we can't use what we now know to solve the problems of the classroom.

GROUP REPORTS--Monday, April 11

Dr. de Kieffer, Seminar Co-Chairman:

Tonight we will hear from six discussion groups regarding their reactions to the presentations which were given today.

Group 1:

The discussion in Group 1 started with the question, Why are you participating in this conference? Several good reasons were given:

1. To gain information. They wanted to get new ideas about things being done elsewhere.
2. To receive the motivation and stimulation which results from various points of view.
3. To discover what could be done in the way of research in the various states.
4. To determine how to bridge the gap between research and actual practice.

The people in our group have heard a great deal about Title VII and the newer media. They hope to get first-hand information about them. We felt that we had a good cross section of interest within Group 1. We had representatives from audio-visual education, educational television, commercial television, professors of education, representatives from ASCD, from several departments of education, from state teachers associations, and several persons involved in educational research.

Our group expressed a desire to know more about Title VII: what has been done, what needs to be done, and what can be done. We also discussed the duplication of research and concluded that it is often ridiculous to repeat comprehensive research projects and studies. With reference to Section B of Title VII, which is devoted to research dissemination, we discussed ways of implementing this dissemination program in our various states and how such projects might be financed.

The group then spent considerable time discussing the newer media of communication and decided that we, as individuals, would have to spend more time reflecting on the implications of newer media to modern education. Many members of our group were concerned about the cultural and social lag between research and the application of research.

There also seemed to be considerable concern as to what we in education might do to close the gap between research findings and the utilizations of these findings in classroom situations.

Finally, we discussed possible approaches to school financing. It seems unfortunate that educational institutions must have the total amount of funds for particular educational projects before proceeding in a venture to improve the quality of education.

Group 2:

Our group directed its attention to a discussion of the new techniques which are being experimented with in the elementary, secondary schools, and colleges in this country. We expressed an interest in knowing what types of research projects are being conducted in the various Rocky Mountain-Plains states that have implications for this seminar. Opinions were also expressed concerning the need for regional information concerning Title VII projects either contemplated or underway.

With reference to Dr. May's presentation, our group concluded that we really do not know very much about learning theories, but that we should apply the new educational media to existing theories which have been tested and proven. We felt that the users of research (particularly teachers) and producers of research should have more extensive backgrounds in learning theories. It was decided that one of the greatest benefits to the users of research in the field would be an annual book or bibliography of research findings in the media field in a simplified form.

In discussing Dr. Melby's presentation, we decided that the philosophy he expounded concerning the use of audio-visual materials in teaching was extremely sound. Considerable discussion was held on the problem of curriculum. Questions were raised, such as, What should be taught in the public schools? Who is to determine the method by which this material is to be taught? How is the effectiveness of the teaching going to be evaluated?

The group was interested in the status of Title VII and we raised such questions as, Is it doing a good job? How should its effectiveness be evaluated? What can this seminar contribute to its effectiveness?

There was a consensus that state departments and teachers must have up-to-date equipment if they are going to produce teachers equipped to utilize the newer educational media.

Group 3:

Our group considered several problems which it thought were important. First was a discussion of the Title VII program. We directed our attention to the projects which have been funded under this title, particularly with reference to their content, where these projects were located, under whose direction they were being developed, and the results being obtained. There was some concern among various members of the group relative to the rejection of projects, particularly in terms of the criteria used to evaluate their importance. The group felt that more information should be given to the individual researcher whose projects have been rejected.

We discussed Dr. Melby's presentation--particularly that section which dealt with the humanistic approach to teaching. We wondered how important the teacher really is in a classroom and how effective he is in reaching the individual students.

We were quite concerned about automation and teaching machines. We discussed how a teacher might most effectively utilize the free time provided by automation in working with individual students.

Another main concern of the group was the preparation of teachers. We wondered whether we are preparing teachers to work with individual students or whether we are concerned primarily with subject matter content. The group concluded that now is the time to evaluate our teacher education program.

A question was raised as to whether educators were at fault in the extensive lag between what has been proven by research and the use of research findings in education. An additional question was asked: To what extent are our research findings currently being used? We agreed that the lack of communication was involved, to a large extent, in answers to these two questions. It was suggested that our state departments of public could and should take an active part in disseminating the findings of research in a language that could be understood by public school teachers and administrators. We felt that public school people have difficulty in locating research findings which are applicable to problems which arise in the local scene. School people often need assistance in locating and interpreting research findings, which might be used in solving local school problems.

We felt that a demonstration team might be developed which would travel throughout a region to provide training and information concerning the newer educational media, the latest research practices and findings which would be beneficial to local schools. It was also agreed that many of our teacher training institutions had a limited number of instructors who are using research findings in their own teaching. It was concluded that many instructors are unaware of research findings, even those developed in their own institutions. Finally, we concluded that we were concerned with the effectiveness of the teaching of values to students. The idea was expressed that the newer media might not in anyway enhance the teaching of values.

Group 4:

Our group was very representative--including superintendents, deans, college professors and administrators. They all contributed to the discussion. Our first concern centered around the determination of those states which were conducting research under Title VII. Only one state, New Mexico, had submitted a project proposal which was acceptable under Title VII. Other projects which had been submitted by various states and not approved were also discussed.

There was concurrence that the use of newer media of communication does not provide a cheap method of education, but they can most effectively be used to improve the quality of education.

Our discussion then proceeded to the problem of the existence of research which everyone at the seminar seems to be talking about. Where is it located? How readable, or unreadable is it? We concluded that a bank of research findings was necessary. Through this bank anyone could draw specific information about any particular study. It could be written in a language which would be understandable to public school people. Such a center is in the realm of possibility and would probably be available to us if we submitted a proposal to the U.S. Office of Education.

We agreed that educators are not the only people in the United States interested in research findings. A review of the Congressional Record would indicate that Congress is also interested in the needs of exceptional children, and that it is very anxious to determine ways of meeting this need.

It was also agreed that a common understanding among researchers was necessary concerning the nature of educational research, directions and purposes. We feel that our problems do not deal with one discipline alone nor with one specific type of research. We must develop critical thinking.

We were concerned as to whether research should come from the local level upward, or whether a national research program should be established and the results handed down to the local level.

Our group believed that research projects should be encouraged at the local level and that the school administrator has a very important role to play in the development of this research. Finally, we believed that everyone, including administrators, must learn how to use the newer media of communication. This will entail intensive inservice training programs.

Group 5:

Dr. May stated this morning that our educational objective should be analyzed in terms of the desired responses, directed toward specific outcomes. When the parts are isolated and identified, they are more effectively taught. This approach results in better overall learning. The abstract objectives of education must be identified in terms of specific responses. This, however, does not mean that we should not continue to have abstract objectives. It was further noted that some of the desired outcomes must be different from student to student.

With reference to needed research the group suggested that more should be done in terms of motivation as a basic principle of learning. The discussion then centered around the need for local (action research) research project. It is sometimes difficult to apply pure research in a school situation, when what is needed is action research. Our group agreed that educators could and should make better use of research findings, but expressed the need for more centralized information agencies. Such a center could give answers concerning research that has been done in the past. The administration of a centralized agency was also discussed. Questions were raised as to how much coordination and cooperation is desirable through such agencies. It was felt that more deliberation was necessary before final conclusions could be made on this point. There was a concensus that more budget was needed on the local level for in-service training programs, informal research projects and evaluation of current education programs.

Group 6:

Our early discussions were directed toward the presentations of Dr. Melby and Dr. May, which were quite complementary to both speakers.

Our next point of discussion centered around the problem of the purposes of this research seminar. Namely, what was to be accomplished and what could be expected from it by Wednesday afternoon.

Our attention was then centered on some of the changes needed in our educational system. It was agreed that flexibility was mandatory in a way that has never been attempted before. We concluded that all of us must look at new developments with an open mind and begin to analyze ways in which technological developments might be used in our own school systems.

Our group was also concerned with the dissemination of research findings. We concluded that one of our basic needs was the availability of synthesized research projects through some type of regional distribution.

Tuesday, April 12.

Dr. LeRoy V. Good, Seminar Co-Chairman:

This morning we turn our attention to the next problem which relates itself to The Role of Newer Media as Related to New Directions in Education. In this context we have three presentations. The first one will deal with teaching machines, the second with television, and third with "other systems" such as team teaching and learning laboratories. Our first speaker, Dr. Edward Fry, will discuss "Teaching Machines, An Introduction For Researchers".

Dr. Fry is one of the best informed people in the Nation on teaching machines and has written widely in this area. He entered this field from educational psychology with a concentration in the area of reading improvement. His current activities include serving as a consulant on teaching machines for a U.S. Navy research project and a reading test project for the California Test Bureau.

Dr. Edward Fry:

Teaching machines are a very popular area of educational research right now. There are many reasons for this. They offer great promise for many fields of instruction. They offer us an economical method of instruction which embodies proven learning principles. They give the researcher a chance to hold the troublesome "teacher variable" constant while he experiments with different methods of presentation, rewarding or branching. They simultaneously provide for our fast and slow students. They, to some extent, offer promise of alleviating the teacher shortage particularly in the newer curriculum areas such as electronics, newer mathematics, and uncommon foreign languages.

It is not unforseeable that in the next ten years some of our better elementary schools will be teaching binary arithmetic, Chinese, and molecular theory as indeed a few pioneers are already attempting. How many elementary schools have qualified teachers in these subjects? On the other hand, could these same schools afford several hundred dollars for a few machines and some program material to teach these subjects to at least a few of its brighter students?

We are sure to hear the cry that teachers are being replaced by machines. But penicillin hasn't replaced doctors and dish washing machines haven't replaced housewives. The hack teacher that has no more to offer than routing assignments and paper correction supplemented by playground supervision and PTA meetings will not be missed when replaced by more efficient methods. While, on the other hand, the master teacher who can inspire students and learn new subjects along with them will be more needed than ever, and possibly better paid as we learn to value these truly human qualities.

For those readers who are not familiar with teaching machines let me give a few of their cardinal principles so that there will be no confusion between teaching machines and educational television, motion pictures or traditional audio-visual devices. A teaching machine teaches one student at a time. It goes as fast as the student is able to go (Or as slow).

A teaching machine requires an active participation on the part of the student, usually in the form of responding to questions. The student is frequently rewarded, usually by knowledge of results (telling him that his answer is correct). Machines usually present only a small bit of instruction at a time and this is usually part of a carefully sequenced program that has been tried out on similar students. Newer teaching machines may provide branched programs, i.e., student's error responses may determine the difficulty of the subsequent items. In fact, teaching machines take as their model a tutor rather than a classroom lecture as does the motion picture.

Here are a few sample descriptions of teaching machines:*

Simple Write-In Machine

This device, used mainly by Porter is a write-in type of teaching machine. It merely controls the exposure of mimeographed sheets of paper so that only a line at a time can be shown. The student writes directly on the exposed line then moves a lever which exposes the answer and the next line. He can still see his response under a sheet of glass; he indicates on the answer line whether he was correct or incorrect. The device is hand-fed but satisfactorily prevents cheating, which could be accomplished by looking ahead. It has been used by Porter to teach spelling to second and sixth-graders, and by Schutz in Arizona for programming problems. Similar simple write-in machines are Rheem's DIDAK 501, the Foringer Machine and the Bell device.

Computer

An IBM 650 digital computer was used with a typewriter input-output as a teaching machine. Knowledge of results was given by having the typewriter keyboard freeze if an error was made. Branching was also used: students who responded correctly could elect to skip items.

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*Reprinted from Fry, E.B., Bryan, G.L., and Rigney, J.W., "Teaching Machines: An Annotated Bibliography," prepared for the ONR by the Department of Psychology of the University of Southern California, November 1959. This bibliography, in revised form, will appear in the April 1960 special issue of Audio Visual Communications Review published by NEA.

Punch Board

The Punch Board was developed by Pressey at Ohio State. It is a small board, about the size of a man's hand, which contains rows of holes. Multiple-choice questions are presented on a separate mimeographed sheet, and the students respond to each question by pushing a hole in the appropriate row. If his choice is correct, the pencil goes deep into the punch board; if he is wrong, the pencil does not go so deep. Each punch, correct or incorrect, makes a hole in the paper, which can be preserved. Numerous studies have been done at Ohio State by Pressey and his graduate students, using this punch board. Navy Special Devices Center has developed a very similar punch board and has sent some to the fleet for utilization.

Scrambled-Book

The Scrambled Book presents a problem situation on the first page with several multiple-choice answers at the bottom. The student responds to the question by selecting an answer at the bottom, which gives a page number. He then turns to this page and is told whether or not his selection is correct and why. This device provides branching, which means that students making incorrect responses are given remedial help or are led to repeat a certain section of the main program.

Automatic Rater

The Automatic Rater is a multiple-choice type of teaching machine. It was used during World War II by the Navy for incidental training and currently is being used by Keislar at U.C.L.A. for experiments in teaching arithmetic to children. The subject looks at a question on a small screen, then responds by pushing one of five buttons. He is given knowledge of results before the machine will move to the next line. Items are stored on a film loop. There is no variation in sequencing or mode.

Programmed Text

This device, developed by Homme, Glaser and Evans, is a unique form of textbook. The top third, or panel, on a page presents a question. The student responds to the question subjectively and then turns the page to learn the next question on the top panel, continuing as before. After the student has worked through all of the top panels, he returns to the front of the book and works through the middle panel; then the lower panel.

As Fig. 1 shows, there has been a startling increase in teaching machine studies in the past few years and there is no indication that the rate of increase has slackened. Though there has always been a lot of articles about teaching machines (such as this one) rather than research reports, there are indications that the articles in this field in the next few years will take the following directions:

1. Salesmanship articles spreading the word to the uninformed,

appearing in state bulletins, the physics teachers journals, classroom teachers magazines, and last, but not least, the Sunday press.

2. Programming. The big research money today is going into development of curriculum materials for machines.

3. Applications. There are very few large scale applications. Larger school systems will begin field try-outs.

Those interested in educational research will find many uses for teaching machines both in applied studies and theoretical studies. Studies already completed have given us glimpses of exciting possibilities plus some tools and facts with which to begin work. Where the teaching machine movement will now lead is in the hands of today's researchers and those bold enough to support them.

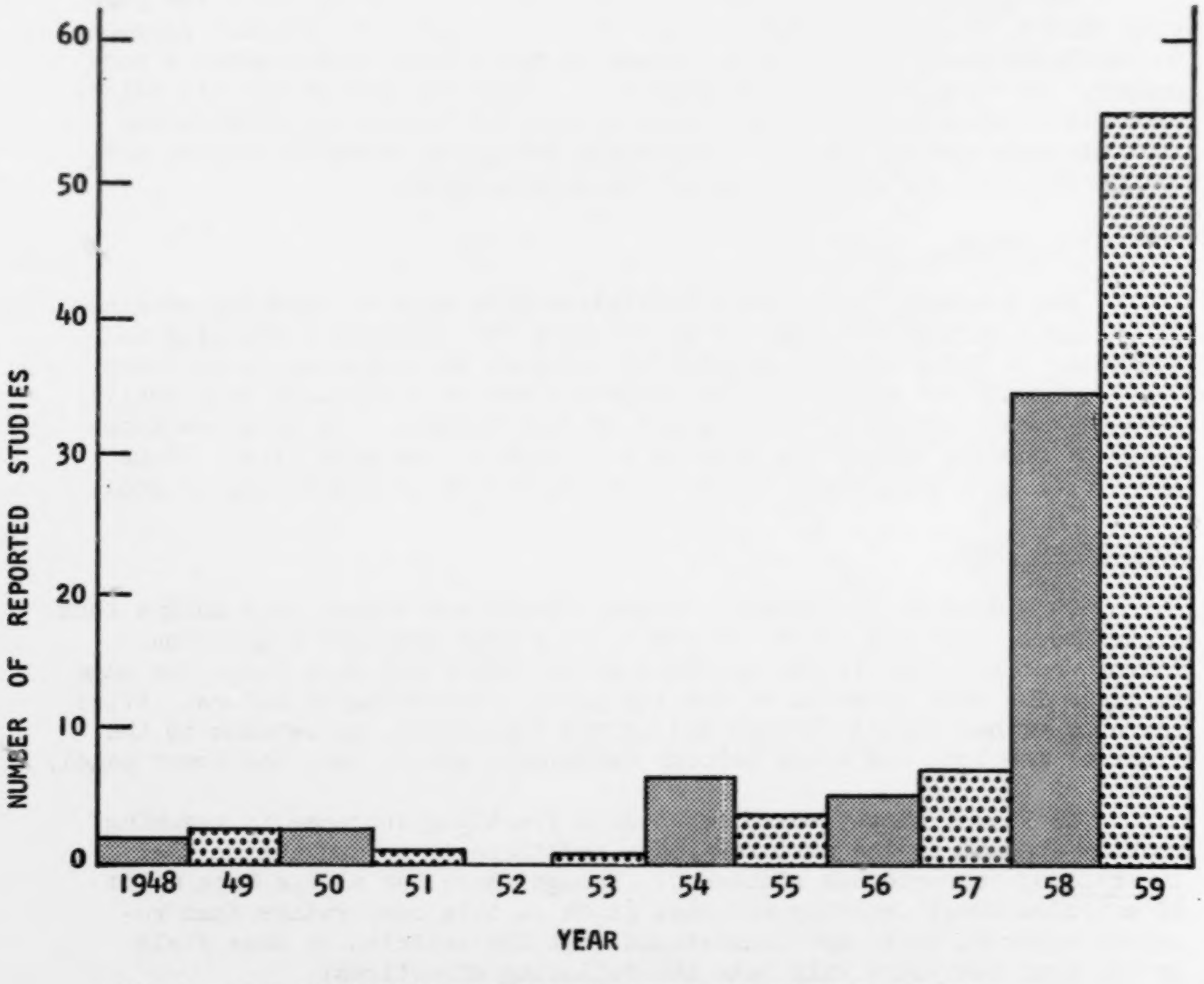
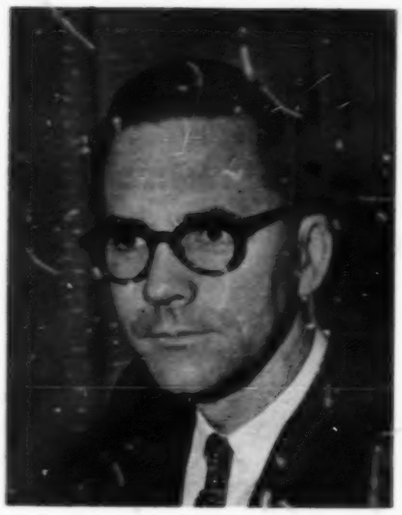


FIG. I. THE FREQUENCY PER YEAR OF TEACHING MACHINE STUDIES. THERE WERE SIX REFERENCES PRIOR TO 1948.

Dr. LeRoy Good:

Our next catalyst, Mr. James Robertson, will discuss "Television".



James Robertson, veteran broadcaster, started as a radio announcer when 15 years of age, and is now the Director of Station Relations for the Educational Television and Radio Center in New York. As Director, he maintains liason between the Center and the 33 non-commercial educational TV stations. The Center serves as headquarters for the growing National Educational Television Network.

James Robertson:

A friend of mine who is a professor at Northwestern University in Evanston has written--just for the fun of it--a little book entitled "The Egghead and The Others." It is devoted to the activities of a professor who finds great profit in lecturing about the evils of commercial television. During one lecture, a chap in the back row (who seems to be better informed than the professor himself) asks the question: "Professor, what is educational television?"

The baffled professor answers: "A contradiction in terms."..and goes on with his lecture.

My point in lifting this anecdote from Professor Donley Fedderson's little book is not to imply that professors know nothing about educational television. In fact, many of the people today who know most about educational television are professors. My intent is to remind all of us that we were first exposed to TV as a medium for entertainment, and in considering it as a medium for education we must overcome our initial impressions.

Next we are called upon to grasp all at once the great many different ways in which television is being used today as an aid to instruction, and to assign it its proper place in the total picture of American education. It is not very surprising that we have been unable quite to do this in the short period of seven years since the first educational television station went on the air.

In the first place, the educational uses of television have become so numerous and varied that none of us yet has had time to gain a clear understanding of relative strong and weak aspects. To be sure, serious research in ETV has been undertaken in many places and consistently has shown "no significant difference" or that results of TV instruction are "at least equal to and in some cases better than" conventional instruction. There is no question but what one can teach effectively via TV. But this is not enough, and to date research is not so helpful as it might be. Research purposes differ widely from one study to another. The conditions under which various studies have been done vary so greatly that there is little reliable correlation of results. Techniques used for measuring effectiveness of televised instruction are for the most part the same techniques used for other media, and may or may not necessarily indicate whatever unique values are communicated by televised instruction. In addition to all these factors, there has not been in the field any central agency responsible for publishing and disseminating ETV research results. Our understanding of what we are accomplishing, therefore, comes in pieces which we must fit together for ourselves as best we can.

Not only are we confronted with these difficulties in attempting to grasp television's role--but the nature of American education itself is changing. As was copiously noted yesterday, the responsibility of the educator is being re-defined in the face of rapidly changing conditions...fewer teachers, more students, and an increasing volume and complexity in the things to be learned! While this makes our assignment all the more difficult, it also underlines its importance. For in its present crisis, American education needs educational television. How best may it utilize ETV in the attainment of its new goals in a changing society?

Let me propose a road map for our discussion of this question, so that my remarks do not send each of you off along mental paths of your own and leave me here by myself, still facing the problem.

As a preliminary step, we shall establish the existence of three somewhat different distribution methods for educational television--closed circuit TV, use of time on commercial stations, and the special characteristics of non-commercial educational television stations--for each of these has its own advantages and disadvantages.

Then, suppose we spend a few minutes reviewing past and present uses of television in education...the things which have been and are now being done around the country. As we do so, we will note: the tremendous range of uses, the specific role which TV is playing in the larger learning process, and the major problems faced by our colleagues who are trying to find the best ways to use television in education. Then I believe it will be useful to take a quick look at future experimental developments, three of which are now on the horizon and hold interesting implications. Upon such a background, we ought to be able to set out several questions to which our researchers may direct their attention for the eventual benefit of us all.

As to television distribution patterns, I referred a moment ago to three somewhat different television methods, all of which come rightly under the heading of educational television, and each of which has its distinct advantages and disadvantages to the educator.

Closed circuit television normally means sending the television picture and sound from a point of origin to various viewing points by wire, rather than transmitting through free air. This is the method associated with the Hagerstown and Penn. State projects. On such a cable system, several programs can be provided simultaneously, allowing each viewing room a choice. This choice is not necessarily a characteristic of every closed circuit installation, but is one of the inherent advantages of a closed circuit system over on-the-air transmission. The closed circuit system is useful and economical to tie an originating point to a limited number of viewing points, the major limit being the budget you have for cable. At some juncture, it becomes economically unfeasible to try to connect too many of these points, and the alternative of an on-the-air station which can be received anywhere in the community becomes more interesting.

Use of sustaining time on commercial television stations must not be overlooked. Remember what New York University did with "Sunrise Semester". The same thing is now being accomplished in scores of cities through use of fringe time periods. The effectiveness of this type of broadcasting depends to a large extent on the degree of cooperation which can be elicited from the commercial station manager. The limitation, of course, is that by definition if not by preference, the local commercial station is in business to make money....and is able to offer air time for education only so long as it does not interfere with the station's business. But educators in every community ought always to be alert to useful time periods which local commercial stations are willing to provide.

The non-commercial educational television station is, of course, uniquely suited to the needs of the educator since this is the purpose for which educational TV stations were created. Because the educational TV station is committed to the same goals as is the educator, because it has no commercial sales pressures, because its operating hours are governed by the most effective scheduling of just what the educators of its community wish to undertake, and because its own personnel have been selected for the specialized purpose of producing educational television--the educational TV station is, in many respects, the ideal medium. Its only drawback is that it can transmit only one program at a time. As the interest in and demand for televised instruction grows, each educational TV station eventually is faced with more program demands than there are hours in the day to accomodate them. Its management then must attempt to strike an acceptable balance between televised instruction and general educational program service. In two communities this pressure already has resulted in establishment of a second educational TV station to handle the overflow. Both Pittsburgh and Oklahoma City have two non-commercial educational TV stations--a VHF station carrying programs of both instructional and general nature of use to broader audiences in the area, and a UHF channel to serve schools properly equipped with UHF receivers and other specially organized viewing groups.

All three of these TV distribution methods, if we can call them that, are useful to the educator and none should be neglected.

The tremendous range of educational uses of television--for varying purposes--and on every level from pre-school to the fourth year of college--

makes understanding difficult and satisfactory description well-nigh impossible. Citing of individual cases leaves a fragmentary impression. Numbers themselves are not necessarily important to our present thinking, since in nearly all areas to be mentioned there are now substantial numbers of actual cases. I fear I would bore you by offering merely a catalogue of the 200 odd colleges and universities offering their own courses for credit, or the 700-odd school systems using TV in the classroom. John Scanlon of the Ford Foundation, who struggles manfully to keep abreast of such statistics, said in New York last month he would "guesstimate" the number of school and college students now receiving a part of their daily systematic instruction by television as "well over one million." This is to be compared with his figure of half a million a year ago. Other estimators call this figure conservative. Hartford Gunn, manager of WGBH-TV in Boston, in telling of the growth of in-school television use in the New England area, reports a beginning with 30 schools a year and a half ago which now has grown to 176 school districts today, and he estimates that these school districts comprise almost half a million boys and girls--and this is service of only one of 46 ETV stations.

So let's forsake actual numbers and instead review the variety of present uses of television in education. On the college level alone there are seven distinct educational jobs in which television is assisting. There are credit courses for on-campus resident students, who watch in dormitories, lounges, or classrooms. Subjects taught, among many others, include:

American Literature
Biology
Business English
Humanities
General Psychology
English
History
Spanish
Theology
Anthropology
Physiology
Sociology
Accounting
Air Science
Electric and Magnetic Field Theory
General Chemistry
Graphics
Education
Economics
Meteorology
Marriage
Music Appreciation
Zoology

There is a similar variety of credit courses for off-campus students, home-bound older adults who wish to continue their college work but cannot get to the campus to attend class. There are non-credit courses of all types. There is specialized professional training such as that now common in the nation's top medical schools. There is university extension programming, enabling a top farm specialist or home economist to demonstrate new procedures or bring new understanding to thousands of constituents watching television receivers all over a state. To furnish the same information to the same number of people in person would take the extension specialist several months of travel and talk. Colleges and universities also are using television to reach into the livingrooms of persons not normally in contact with educational institutions as such, providing them with general adult education in areas such as economics, political science, world affairs, parent education, and the arts. The seventh category of TV assistance to education at the college level is in the form of the nationally-syndicated course known as "Continental Classroom." One of the nation's gifted professors teaches a quarter of a million students, each of whom receives course credit through a cooperating college or university near his home.

Add to these jobs TV is doing for colleges, eight others it is doing for elementary and secondary schools. Some school systems have experimented with what is referred to as "total teaching," that is, the classroom student receives all instruction from the teacher on the screen. Then there is "direct teaching" but not total, wherein the instructor on television presents the basic lesson material, but the follow-up and discussion is a responsibility of the classroom teacher. This is what Dr. Alexander Stoddard now refers to as "team teaching." I know there are other meanings for this term, but in this instance Dr. Stoddard is talking about teamwork between a television instructor and a classroom teacher, acting as two complementary parts of a whole. This pattern is generally more satisfactory. It makes possible an expert presentation of material on television--using the most gifted teacher available and giving her time to prepare her presentation thoroughly and to enhance it with all the visual devices, special equipment, or use of guest personalities which television allows--and also furnishes the student with a qualified teacher at his elbow to prepare him in advance for this learning experience....then after the program to answer his questions, probe his thinking, follow up on the TV lesson in whatever specialized manner the individual situation requires.

Then there is the type of television program which does not seek to teach directly but rather to "re-enforce" the learning experience, or to "supplement" or to "enrich" it. Here television provides the extra experience which enhances the meaning of the lesson material already presented in the classroom. This is the poet himself reading his poetry, or the senator describing his problems as a member of government, or the field trip to a museum or to the telephone company or to a lumber mill. These experiences can be brought into the classroom more effectively and with more immediacy by television than by any other medium.

Then there is "out-of-school viewing." Alert teachers for several years have been assigning certain television programs as "homework." Here the program itself is not built by the educator, but rather is selected by the educator as an especially useful part of the passing scene. This applies to opera, great drama, news reports, special coverage of political events of historic importance, and so on.

There are special values to television teaching for the small rural school where no resources exist to provide anything more than the most basic instruction. Last spring I visited a small town high school in Nebraska, average graduating class 14 students. Until this past year, no graduate of that high school ever had gone to college. Last September, four students went to college as the result of mathematics courses they had taken by television during the two previous years. No such mathematics instruction ever had been available before to the pupils in that small school. The same math instruction was used simultaneously with similar benefit in nearly 100 other rural schools in Nebraska.

Aid to the slow learner, and aid to the gifted student are services every school would like to offer, but under present circumstances too often is unable to. Television can help--either by providing the *special* instruction itself, or by providing the *standard* instruction for the average students, thus freeing the regular teacher to spend additional time helping the boy or girl at the top or bottom of the class.

In this connection, mention should be made of the use of television to provide various types of marginal or experimental courses which could not normally be accomodated within the curriculum or which require additional teachers with special skills. Foreign language in elementary grades--special music and art courses--advanced science and math courses--driver training. These subjects are offered successfully on TV in school districts where it would be difficult if not impossible to provide adequate teaching staff to furnish direct personal instruction.

This review of the range of jobs television is handling both on the school and college level may have suggested several generalizations which ought to be made about the proper use of televised instruction. Let me draw them out into the open, for in so doing we shall discover something of the nature of television's present contribution to the total educative process.

Television is not so much a "*solution*"to education's problems as it is an "*aid*" in solving them. *TV can* solve no educational problem all by itself. It must be properly used, the same as any other aid to education. Textbooks do not solve problems all by themselves, either, but must be used wisely as aids in the total process. A chemistry laboratory, fully equipped, still cannot teach anyone anything all by itself--there is no special magic about it. So also with television. If improperly used, TV can be wasteful--in the sense that the job might have been done better another way. One might even say that TV's use should be restricted to situations where it can measure up to the following criteria: First, *it must serve a local need*. Let's not have television just for the sake of having television, nor do things with it just because they have been helpful somewhere else. Let's use it to assist in solving specific local problems. Second, *it must be used only for what it can do better than could be done normally*. In a few cases around the country, I have seen some television teaching which seemed to me to be *worse* than the average classroom teaching! Let's not use TV to multiply *mediocrity*. Also let's not use it in learning situations requiring the active exchange of ideas within the student group, for essentially it is a one-way medium. Let's use it only where we believe it can do the job *better* than it is now done in the traditional manner. Third, *it normally must be an integral part of the larger total learning situation*. I am now referring again to the inter-relationship between the part of the learning experience which comes over television and the preparation and follow-up at the receiving end. On the college credit course level, the adult student at home must be fully prepared for what he is to see and hear. His viewing must not be in competition with other household activity; the kids must stay in the other room or be put to bed ! If the course is

Accounting, the student must have the proper business forms ready to work with. If the course is Political Theory, he must have read the necessary text material in advance. His study guide must include explicit instructions concerning reading, work assignments, preparations, and follow-up. Some colleges even announce for the benefit of off-campus students special hours during which the television professor is available by telephone to answer specific questions for homebound students.

On the elementary and secondary level, it means that the classroom situation must be under complete control, that reception conditions must be right, that the mind of every student in the room must have been prepared for what he is to see and hear--and after he has seen and heard it, the follow-up in the classroom must be tailored to the needs of those students and their questions.

In stating these three generalizations, I have now hinted at several problems which must be solved in order to make television instruction effective. TV is a tool we must learn to use. When it is not used properly, it may disappoint us. This is why when you read an account or hear a story of an educator's disenchantment with educational television, the question always must be asked: "What did they do wrong?" It is not the tool which fails; it is the user who has not yet mastered the tool.

Let's take a closer look at four major problems which are common among those who are trying to master ETV today.

Some of you may expect me to name the first problem as "MONEY"! I am not going to do this, because we all know that fundamentally we are going to spend a lot of money in education anyway--what we really are concerned with is how to get the greatest educational benefit from the dollars we spend. Well, the benefits to be derived from the use of television as an aid depend to a large extent on how well we understand what TV can and cannot do--how well we are able to deal with these problems--the ones we have just been talking about and now are about to talk about. A gymnasium is very expensive in any school if it isn't used--but when it is used properly, the cost per student in terms of value received is very small. This is true of every piece of educational equipment, every educational aid. (Of course, I suppose it may also be true of educators. Some of them, in terms of what they really accomplish, may be a little expensive despite a low salary--while others, though highly paid, are worth their weight in gold. This also can be said of television.)

In putting television to work as an aid to education, then, what problems do we face? Common agreement would be reached on these four:

1. Finding and training effective television teachers.

2. Utilizing the medium to its best advantage.

3. Training those in the receiving situation to make best use of television instruction.

4. Overcoming natural reluctance to accept a new way of doing things.

Generally speaking, good classroom teachers and good college lecturers make good television instructors, although this is not necessarily so. There are special techniques any person must master in using television; some people are able to do this easily and others are not. Some cannot free themselves from undue concern for what their colleagues may say about them. Moreover, it is almost impossible to predict reliably the effectiveness of anyone on television until he tries it and you can watch him. There is no established formula for selection of TV teachers who will be successful. Only through careful preparation, recorded auditions, and on-the-air trial have the best television teachers been found. It goes without saying that there is no more important element than the television teacher; unless this person is tops in on-the-air presence, ability to work with others, understanding of normal student reactions, competence in the subject, and is gifted with a high degree of originality and initiative in the planning and preparation of lesson materials, the entire project suffers.

As for "utilization of the medium to its best advantage," this is a matter of capitalizing on what TV can do best while overcoming its inherent disadvantages. Some of the known disadvantages of television instruction are:

1. The problem of getting adequate "feedback" from the student in the form of reactions or questions.

2. The problem of scheduling the televised instruction so that many different schools on different bell schedules can make use of it without disrupting their other work.

3. The problem of providing satisfactory facilities and optimum conditions for reception.

None of these disadvantages proves to be overwhelming, yet each requires serious consideration in the construction of the total learning situation.

The advantages of televised instruction must, of course, be utilized as fully as possible--and too often today they are not. The impact of simultaneous visual and aural stimuli is, as we all know, greater than either one by itself. "A picture is worth a thousand words" was said about a still picture, and television provides real live action together with simultaneous live sound. Here is Robert Frost reading his poem, or President Einsenhower talking to newsmen, or Werner Von Braun demonstrating a rocket model--right here, almost in the flesh. Or let us say that you are the television teacher and you point to a section of a map--or you pick up a butterfly's wing with tweezers-- or perhaps in making a comment about a philosopher you build double meaning into your remark with a very slight smile and a twinkle in your eye. All this is faithfully evident on the screen of every television receiver tuned to your lesson--and in closeup view which can be even better than what an in-person student might see if he were sitting before you--especially if he were sitting in the back row of a college lecture hall accomodating 500 dozing students! In maintaining student interest and attention, television need not at any time come out second best. The objection that television separates the teacher from the student seem to me hard to substantiate when it is realized that on television the instructor can look every single student straight in the eye simultaneously! This is not possible even in the smallest classroom. It is possible on television, even with a quarter of a million students watching in that many homes all across the country. This intimate, direct, person-to-person communicative power of television is something to be fully utilized and never wasted.

As for other well-known advantages: demonstration equipment can be made available in a studio which never could be provided in a dozen or a thousand classrooms at once--guests who could not possibly visit each of those several hundred classrooms in a community can appear in the studio and be seen by all students simultaneously--the very best teaching can be made available in like manner, not just to one classroom, but to all classrooms at once--the substantially greater responsibility of facing so many students at once justifies much more preparation and planning time beforehand and thereby upgrades quality of instruction--every student in a television classroom is given a front-row seat, as the saying goes--more than this, the TV screen can become (through photomicrography) a greatly magnified microscope slide where amoeba and paramecium cells can be viewed by all students at once while they all receive the same comments from the teacher. And so forth! You people need no further description, I'm sure, of the great moments which are possible by means of television instruction. The point to be made here is that these are the moments which should be far more frequent in televised instruction. This is the problem of "using the medium to its best advantage."

The third problem is that of training classroom teachers to make best use of TV instruction. Classroom teachers too frequently balk at the introduction of an electronic master teacher into their classroom, especially if they are led to think about it in those terms--especially if they have not participated in advance planning or have not been oriented properly to the complementary roles which they and the television instructor must play, each assisting the other. In scores of school systems now using in-school television, this lesson has been learned the hard way. Now, through planning conferences months in advance, the actual lessons for a given unit are laid out cooperatively by the television teacher and a representative group of classroom teachers. Proper outlines, study guides, implementing materials are furnished well in advance of the telecast so that she can prepare her own students for the TV presentation in the most advantageous way for them. After the telecast, she follows a pre-arranged plan of utilization and follow-up. All of this takes time and training, but results in enhancement of the student's experience which sometimes borders on the amazing.

Not the least of the values in such a "team" arrangement is the effect all this has on the classroom teacher's own teaching. The thought given to pre-planning, to the goals of each lesson, to the individual differences among her students, and then the witnessing of thoroughly-prepared and truly gifted teaching on the screen has proved to be one of the strongest known methods for in-service teacher training. I know of many classroom teachers who identify this self-improvement as an important by-product they had not anticipated, but one which they sincerely appreciate. Because of this factor, special teacher training demonstrations now are put on the air for teachers only and are showing excellent results.

At the college level, the same principles apply but in different fashion. Here there is a greater measure of individual responsibility vested in the student himself. Even so, the materials and instructions supplied in advance--either to the on-campus student or the home student--have been found to exert a marked effect on his learning.

Problem number four: "Overcoming natural reluctance to accept a new way of doing things." I guess it is common knowledge that most of us would rather keep on doing what we have been doing in the way we've been doing it, rather than bestir ourselves to learn a new way, calling for new skills, new understandings which we do not yet possess. Because of this, we are all prone to find a lot of reasons why the new method probably will not work. And while I am sure that this is not a characteristic of educators alone, there are those who feel it is a fairly common characteristic in the educational profession.

The answer to this problem is INVOLVEMENT. The teachers who have not yet become involved in any experiment with televised instruction can find whole lists of reasons why, even though this works well in other school systems, it won't work in theirs. Once they try it, hardly a week goes by before they are caught up in the challenge of finding out how better to use this new tool which is so expensive yet so effective--so puzzling yet so pleasing. A high school principal in a suburb of Louisville told me: "We had faculty meetings lasting four and five hours discussing all the reasons why TV teaching would not work in our school. That was two years ago. Ever since we started using it, we've been too busy improving it and experimenting with it to bother much with the factors we thought might be most troublesome. We wouldn't be without it now, and I willingly admit that most of those dire predictions we made never came true!"

Taking the nation as a whole, receptivity has been higher in schools than in colleges, probably due to the greater control exercised in schools by supervisors and administrators whereas the college professor is a power in his own right. With numerous notable exceptions, university faculty as a group have not been at all receptive to television teaching. Here again, the pathway to progress seems to be through INVOLVEMENT.

At the University of Illinois recently I talked--or rather, listened--to an outstanding biochemist. Two years ago he grudgingly accepted an appointment to a new faculty committee to investigate possibilities for televised instruction on the Urbana campus. He told me with some humor of his own abhorrence of the electronic communications equipment as a sort of Rube Goldberg contraption which to him at that time seemed entirely out of place on the campus of a great institution of higher learning and dedicated research. This same professor has just completed several sessions of night work with fellow professors in (of all places) the engineering department, studying how best to use television's unique characteristics to teach basic engineering principles. He also has spearheaded a plan for scheduling televised courses on commercial stations around the state in areas not served by the university's own ETV station. He also was instrumental in bringing to the Urbana campus as coordinator of what is now an active instructional television project one of the most experienced people in the profession. "Now, you understand, dont't you," this professor said to me, "that I'm not an educational broadcaster. I'm a professor whose major aim in life is to teach biochemistry--but by golly, look at the good you can do for people with this television thing!"

Essentially, as our N.E.T. president Jack White likes to point out from his experience of sitting in classroom after classroom watching TV instruction in progress, there are three types of teachers. At the top level, one sees a relatively small number of excellent teachers--who would be excellent teachers if they never saw a television set. These men and women take television, use it, capture it for their own purposes. At the bottom level there is a group of very poor teachers. They use TV as a crutch. All you can say of this group is: "What would be happening in this classroom if there were no TV set?" The large group in the middle are those who fear this new medium. They are the same ones who fear everything from technological unemployment, to intrusion, to excessive supervision. There are those who explain this characteristic initial reluctance as a "fear of the unknown." Whether this is true or not I do not know--but I do know because I have seen it happen myself so often--that once such a reluctant one takes the first few steps to inform himself--once the unknown is no longer unknown--once there is INVOLVEMENT, then the resistance changes into curiosity, the curiosity into further study, the further study into experimentation, and the road block to progress has been removed.

So far we have devoted our attention to past and present uses of television in education. It will be of interest to get a quick glimpse of several future developments just getting under way. Let me cite three of them: the Midwest Airborne project, exchange of instructional materials, and microwave networks.

Airborne, as perhaps you know, is a spectacular experiment in six midwestern states to transmit televised instruction from a DC-7 airplane flying in a circle over a midpoint in Indiana. Because of the plane's height it is claimed that it will be able to transmit over a far larger area than any individual ground station could cover. Schools in this area have been invited to install UHF television sets on which they can pick up either of two simultaneous program channels, which ever suits their needs. 40% of the airborne instruction will be elementary level, 40% secondary, 20% college courses. All will be pre-recorded by the best teachers to be found, curriculum needs now are being studied with school people in the six states. Test transmission is scheduled next spring with full service starting in September of 1961. While some aspects of this plan at first seem to border on the ludicrous, the fact is that there is no fundamental technical reason why it should not work if the gigantic job of coordinating service with need can be accomplished. At the very least it is a daring experiment which may well startle some

At the very least it is a daring experiment which may well startle some people into doing some serious thinking about televised instruction who have not thought much about it before. And the course materials recorded for Airborne will subsequently become available to schools and colleges all over the country.

Meanwhile, exchange of school and college courses already recorded on videotape or kinescope is already taking place on a unilateral basis between individual school systems. This has been proving useful enough to indicate the need for a centralized clearing house to handle the paper work, and the arrangements for transshipment of prints, and to publish lists of available courses. Such an office probably will be set up in the next few months. This will mean that an excellent 7th grade science course from San Francisco can be leased for use in Seattle or St. Louis, or that a Harvard University psychology course might be borrowed by a small college elsewhere. The University of Florida at Gainesville has been recording several courses for subsequent use by other state-supported Florida colleges on other ETV stations in that state. In this area of the country, your Western Interstate Commission on Higher Education recently has received a grant toward the development of an exchange of college-level ETV courses among institutions in 13 western states. The implications of all this are far reaching and numerous.

The same can be said of impending developments in microwave interconnections between educational television stations and between educational institutions, whereby a televised lecture on one campus can be fed simultaneously for television showing on other campuses as well--enabling more students to benefit from top quality instruction, with each institution furnishing its best people and receiving in turn, the best people of other institutions. Such exchange arrangements are now in operation between Boston, Massachusetts and Durham, New Hampshire--and between Jacksonville and Gainesville, Florida. An all-state microwave network is well along in Ohio, as is the planning for a similar regional network linking ETV stations in Wisconsin, Minnesota, Iowa, the Dakotas, and Nebraska. While such interconnections will greatly enhance general educational and cultural programming on ETV stations by making the riches of one community available to several others, perhaps their major importance is as a facility for the exchange of great teachers on all levels. This cannot help but result in higher quality instruction, which presumably is a goal toward which every educator and every educational institution constantly strives.

There is something about these new developments in an already new field that demonstrates the necessity for keeping our eyes and ears all the way open and our minds alert. If we are to measure up to our responsibilities--if we are to learn how best to use this new medium to serve the new needs of American education--we must (to use the vernacular) "get with it and stay with it."

What are our immediate means of doing this?

It should be fairly clear from this review of television in education today that there are plenty of questions for us to turn over to our friends in research. Since the questions which are in my mind simply echo the various implications of my preceding remarks, let me state them briefly in summary--with the hope that they may provide specific material for our discussions later in this conference:

1. How can we refine the process of finding the most effective television teachers?

2. How do we spring loose the best teachers so they can be made available to more students through televised instruction?

3. What are the specific unique qualities of televised instruction which most significantly affect the learning process?

4. How can we improve quality of teaching in the classroom itself through better use of television?

5. What special materials, perhaps not yet invented, should be provided the home student in order to insure maximum effectiveness from his independent television study?

6. How best can we involve more teachers and professors in televised education so that more trained intelligence can be brought to bear on best uses of this new medium?

7. What are the implications in my schools or on my campus arising from future exchange of instructional materials, and how can we keep the possible difficulties from blocking out the potential benefits thereof?

8. How can we better correlate and digest all research in ETV so that those who most need to be informed about television teaching can keep themselves better informed?

Beyond these fairly evident questions, let me suggest also that further thought may enable us to formulate other less obvious questions--such as this one, which intrigues me: How can we develop ways of studying the nature of the learning which takes place as the result of television instruction--being sure that our methods of measurement actually respond to the unique characteristics of this new medium, rather than measuring only those outward signs of learning which traditionally have been measured in the classroom? That's pretty complicated. Let me try to explain what I mean by suggesting a parallel problem.

At any given grade level in school, how much should scores earned by the student on tests be counted in his final grade as compared with the teacher's own assessment of the student's achievement?

This, I realize, is a debatable point. I raise it only to demonstrate that even at our present state of measuring traditional classroom achievement, there are certain aspects of student achievement and growth apparent to a discerning teacher which no test will reflect.

Is it not likely, then, that tests so far designed may not show certain values which a student viewing a striking personality or a memorable demonstration or performance on television may nevertheless receive?

For example, how can one measure the inner value to a sensitive boy or girl of seeing Robert Frost reading his own poems on television--in closeup--facial grimaces, sparkle in the eyes, voice quality and all--compared with the value to that same boy or girl of the same poem being read by a teacher in the classroom?

Right here, in this un-measurable element, may be hidden the priceless strengths we can build into televised instruction of the future. Perhaps this elusive nuance is the very element which it is our responsibility to isolate, to identify, to utilize.

Probably there are other similar questions equally intriguing, but there are subjects other than television which require discussion today, too--and we must move along.

Presentation of this overview of television as one of the newer media in education has been an exceedingly difficult assignment, particularly before this group. Many interesting aspects of the subject have not even been mentioned. I have been unable to include much that I have seen in my visits which deserved discussing, though I have tried to select the elements of greatest pertinence. I am aware that some of the facts reported are new to some of you; but there are persons in this room whose work in this field has taken them far beyond any developments I have mentioned. In my determination to avoid offering you a mere statistical abstract, I may generalized too much. All I would wish to emphasize in this respect is that everything I have reported can be documented, and if you desire specifics I'll do my best to direct you to appropriate sources.

If you find yourself mighty confused at this point about educational television, do not be disheartened. Those of us who have been deeply involved in ETV for some time now accept this condition as normal.

But we find that rather than impairing our efforts, the confusion tends to strengthen our perseverance--for through the haze of temporary uncertainty, we know now that some bright new horizons we see far ahead are not a mirage--they are real. It is up to all of us to see that we eventually arrive. And while all of us must be careful in our analysis, exacting in our evaluations, rigorous in our research--let's not be afraid to allow ourselves to enjoy the unmistakable glow of excitement about these new possibilities before us.

After all, learning is said to be the most exciting aspect of living--and learning is exactly what we are doing!

Dr. LeRoy Good:

Mr. Robertson, our catalyst, has given us a thorough background on educational television as one of the newer media. He has presneted us with many challenging ideas for the application of this new media to educational purposes.

Our next catalyst will be Dr. Lindley Stiles, who will discuss "Other Systems, Including the New Developments in Team Teaching and Learning Laboratories."

Although Dr. Stiles was born in New Mexico, he did his under-graduate and graduate work in Colorado. An extensive writer and speaker, he is now the Dean of the College of Education at the University of Wisconsin.

Dr. Lindley Stiles:

As necessity is the mother of invention, instructional teams and learning laboratories are the product of educational crisis. Multiple factors compel experimentation with these concepts for improving and re-organizing instruction in elementary and secondary schools. However, the various forces impinging on schools may be classified, they all underscore three objectives that shape the direction of education--universality, quality and efficiency.

Instructional teams and learning laboratories are conceived as contributing more effectively to these basic goals. How well such approaches to teaching will succeed, in comparison to established procedures, remains yet to be fully determined by research and demonstrations now in progress. Preliminary reports reveal both enthusiasm and promise. Yet it is becoming clear, too, that such procedures may not automatically improve educational effectiveness; they must be employed with skill and wisdom--as is true of any other approach. Not all teachers, for example, can function as members of instructional teams; nor are all subject fields equally adapted to the advantages of every type of learning laboratory. Nevertheless, one general premise seems valid: If universality in elementary and secondary schools is to be maintained in the face of the teacher shortage; if excellence in education is to be achieved in an age when knowledge is expanding so fast that specialization is necessary if it is to be properly mastered, used and taught; if students are to learn more in less time, to retain mastered skills and information longer and use them more effectively, in short to play over their heads intellectually--if such basic goals are to be accomplished, ways must be found to increase quality and efficiency in teaching and learning.

Challenges to the Status Quo

During the past thirty years, instructional procedures in elementary and secondary schools have been steadily under attack. As universality increased, demands for adaptations to individual differences became more insistent. When larger classes reduced student participation, the long-established recitation came under fire. The developing scientific method was the source of a theory of teaching that focused attention on the student's re-enactment of the process of discovery and interpretation rather than on the teacher's presentation of the "packaged" results of scholarship. At the same time, mass education was producing, particularly at the upper levels, mass teaching. Paralleling these procedures were developments in audio-visual instruments that offered new resources to aid communication between teacher and student.

Patterns for organizing instruction were also undergoing change. Consolidations of one-room schools into larger units, with more pupils per grade or course, permitted instructors to concentrate on teaching particular grade levels or subjects with commensurate specialization in their preparation. Emphasis on departmentalization, in both secondary and elementary schools, fluxuated from a high degree of specialization to arrangements that required teachers to teach all subjects in a grade or several fields at the high school level. Each plan for the organization of instruction achieved popularity for a time, largely, because of the advocacy of leading educators rather than from proven evidence of superiority. In recent years, the pendulum has swung toward the arrangement of one teacher to an elementary grade group or high school subject.

The key to the success of the one-teacher to a grade or course plan of organizing instruction rests with the competence of the individual teacher. It should be said that many well-prepared and experienced teachers have demonstrated unusual ability to carry all the multiple responsibilities of the self-contained classroom, or composite course, with amazing success. The number of such versatile teachers is small, however, compared to the demand. For this reason, and in anticipation of even greater shortages of outstanding teachers certain questions are now being raised about whether the one-teacher plan is the best type of organization for instruction in a given school or for particular groups of learners.

1. Is the assumption valid that the varied interests, scholarship attainments and range of professional competencies required for one teacher to carry the full burden of instruction are traits common to all teachers?

2. Is the preparation of the beginning teacher sufficiently intensive, and is interest in all areas of the school program or subject adequate, to guarantee effective instruction in all the skills and content for all pupils? The crucial aspects of this question can be illustrated by examining the demands upon elementary teachers who work at the upper grade level. Here the curriculum includes an emphasis upon as many as eight or nine different broad fields, each of which may include from three to six different subject areas out of which the content

for the elementary school is drawn. In addition, the teachers must be prepared in the various areas of professional education which usually include a minimum of three foundation fields, methods of teaching for various aspects of the elementary school program, and practice teaching. If the preparation for elementary teaching is equated in terms of credits earned in college study, the beginning teachers need perhaps at least 180-200 semester hours of college work if minimum preparation for the responsibilities of the self-contained classroom teacher are to be met.

3. Can the teacher, even when well prepared initially, keep abreast of the advances in knowledge that are now taking place in the skill and subject fields as well as in teaching procedures? The practice has been for high school science teachers to be trained to teach all the sciences offered in the secondary school, including mathematics. Some qualified educators now suggest that this objective is impossible to obtain, even for the experienced, well-prepared teacher, because the content is so broad and is changing so rapidly.

4. Can gifted children be given maximum help without being in touch with competent specialists in skill and subject fields? Do not they need to work with teachers who are highly specialized as well as capable of motivating and guiding the learning of the academically talented?

5. Is it possible for the teacher in the self-contained or individual-teacher classroom--because of the diversity and burdensomeness of their assignments--to acheive or maintain a satisfying level of creative endeavor or scholarship in any one field of specialization?

6. Are the teacher's personality and professional skill equally appealing to all members of the group of students to justify the exclusive instructional relationship that the individual-teacher arrangements require?

7. Is it not desirable to develop differentiations of professional skills and competence that permit teachers to be promoted from one level to another within the ranks of teaching itself?

8. In the face of the shortage of teachers, does not an obligation exist to extend the benefits of outstanding teachers to as many children as possible?

The Instructional Team

The instructional team is a term used to designate an organization of instruction that matches for instructional and learning purposes a school staff team with a team of students.[1]

Its major purpose is to improve the quality of instruction. It seeks to achieve this goal by making available teachers at their peaks of professional performance to students who are most able and ready to benefit from quality teaching.

Characteristics of the Instructional Team.

One of the oldest instructional team demonstration projects has been carried on in the schools of Lexington, Massachusetts in cooperation with the Harvard Graduate School of Education since 1956. It has been described as having the following characteristics.[2]

1. Teachers are redeployed. This means that instead of a teacher being limited to one group of 25-30,she may, from time to time, work with as few as one student and as many as 100 or more. This is done in order to take advantage of her strengths and to de-emphasize any weaknesses she may have.
2. Children are regrouped. This means that children are no longer established in a group of 25-30 at the beginning of the school year and maintained in that group. Depending on the subject taught, the technique used, the facilities employed and the learning ability of the student children are grouped from time to time in sections as small as one and as large as 100 or more.
3. Flexibility is essential. The school program no longer operates on a regimentized basis. Scheduling and programming are fitted to the instructional pattern rather than suiting teaching to a clock schedule. In size and form the physical facilities are arranged for the benefit of instruction.

Illustrative Types of Instructional Teams.

Types of instructional teams that are being tested in a number of

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(1) Note the use of the word "instructional" rather than "teaching inasmuch as it designates, in addition to professional teachers, personnel who are not certified to teach and who do not actually engage in teaching.

(2) John Blackhall Smith, Team Teaching: An Approach to Elementary School Instruction, Greenwich, Connecticut: The Author (Mimeographed) January, 1960.

schools cooperating in the Wisconsin Improvement Project, under the direction of Dr. John Guy Fowlkes, former dean of the School of Education of the University of Wisconsin, include the following:

1. Cooperation of two or more teachers, either at a grade level or for a broader instructional unit, to pool their special strenghts to help each other. This type of practice has been going on for years with good teachers, often unofficially.

2. A small instructional unit composed of one or more outstanding, experienced teachers and two or more beginning teachers or teachers-interns, which assumes a responsibility for teacher education in addition to attempting to provide better learning situations for children. Such arrangements permit the school system to take a greater responsibility for providing the laboratory phase of teacher education.

3. A composite instructional team which adds to the professional teachers included the services of certain non-certified personnel.

A sample personnel component for the large composite instructional team might be as follows:

Professional staff members:
Team leader or coordinator (Such a person might well be selected from the ranks of outstanding teachers in self-contained classrooms.)
Teacher-specialists.
Team teachers.
Interns.

Non-certified members:
Instructional secretary.
Technicians--for help with audio-visual and library resources.
Teacher aids.
Lay Associates.

The size of the team depends upon the composition and number of pupils in the group to be instructed. In general it is anticipated that the ratio between teachers and students may remain substantially the same as exists in the self-contained classroom. A team of six members, for example, might be assigned to instruct 150 pupils; or a small team of three might work with a group of 70. If the team includes non-certified personnel, such as instructional secretary, technicians, and interns, the ratio of team members to students can be reduced substantially without increasing the cost of the school system.

It will be noted that emphasis is placed in the second and third types of instructional teams on the development of beginning and intern teachers. Such an approach assumes that school systems should undertake greater responsibility for providing the laboratory training of prospective teachers, and closer supervision of the new teacher than has usually been the practice in the past. These two types of teams also include non-certified personnel who can relieve professional staff members of non-teaching duties.

Because the instructional team pattern of organization makes possible the assembling of large numbers of students for group presentations, television lessons, either live or filmed, closed circuit, airborne or emanating from educational or commercial stations, can easily be used to supplement the contributions of team members.

Supervisors, most of whom are now heavily overloaded with numbers of teachers in need of assistance, lend coordination to the work of various instructional teams. They find new challenges in helping to develop working groups of teachers and would continue their traditional responsibilities for leadership in curriculum improvement. Principals find opportunities for creative leadership both in the in-service education and utilization of instructional teams perhaps closer to instruction and curriculum decisions than ever before.

Other professional personnel attached to schools, librarians, guidance counselors, audio-visual experts, supervisors in special fields, visiting teachers, attendance officers, school nurses and doctors provide services to various instructional teams as well as to individual teachers. Each is related to the services he is employed to provide regardless of whether they were required within or without team organizations. In some cases, however, it may be possible to develop strengths within instructional teams that will partially relieve such professional personnel of certain routine and non-professional chores. Such steps will no doubt be welcomed inasmuch as those in these positions, like teachers themselves, are often overburdened with duties that do not require high level professional skills.

Strengths Envisioned for Instructional Teams.

Objective evidence that the instructional team plan for teaching is superior to the one-teacher per group arrangement in terms of how much students learn is yet to be established. A number of the projects have stimulated testimony from observers that teachers, students and parents are enthusiastic about the benefits of instructional teams. Greater independence and increased motivation in learning for students as well as better planning and performance by teachers are outcomes most frequently reported.

Such generalizations do not take into account the well-known Hawthorne effect of "experimental" projects. This phenomenon explains certain highly positive automatic reactions produced in participants by new ventures, the personal attention and democratic involvement that accompany experimental planning, changes in routines, increased time available to special projects and added resources. Some of the instructional team projects have made no provisions for controlled evaluation. Others, (such as those in the San Diego, California, city schools, the Jefferson County schools in Colorado, and schools in Utah as well as Wisconsin) have recognized the need to evaluate, taken steps to measure the degree to which desirable learning outcomes are being achieved as compared to traditional situations, and have urged that judgments be deferred until true evidence is available. It must be admitted, however, as is often true in pedagogical procedures, that as yet our confidence and enthusiasm for the instructional team are based largely on faith and recognition of its theoretical potentialities, rather than on established evidences of superiority.

The lack of objective evidence regarding the value of instructional teams is not necessarily an indictment of the procedure or of those who are pioneering its development. The newness of such attempts is illustrated by the fact that the subject "team teaching" was first mentioned in The Education Index in June, 1957. As is necessary with all new concepts, a certain amount of exploratory activity is required before refined, objective evaluations can be undertaken. It is encouraging that some leaders of instructional team projects recognize the desirability of establishing carefully controlled appraisals just as soon as is practicable. Equally important are the admonitions they give to withhold judgments until reliable evidence regarding the worth of such procedures is available.

In the absence of sound and reliable evaluations, all that is possible at this point is to note the theoretical strengths that have been visualized for instructional teams and which various informal observations seem to be verifying.

1. The instructional team pattern can make possible teaching children in (a) large groups, (b) small sections, (c) individually. It provides, also for independent study by students who have particular academic interests and abilities with consultation with teachers as needed. Flexibility is provided which makes possible the organization of varied sized sub-groups appropriate to the instruction being presented. Such an arrangement, for example, would make it possible for the entire learning group to be assembled for one type of lesson, such as in poetry or music appreciation; for other presentations both large and small groups might be provided.

2. By dividing the total learning group into equal sized subdivisions, which would regularly carry on phases of the instructional program, team members could be given continuity relationships with the same children over a period of time.

3. Students can be brought into contact with highly competent teacher-specialists in both large and small groupings. academically talented students could be assembled together for training in various subject matter fields while at the same time those requiring remedial help could be given similarly individualized attention.

4. Professional members of the instructional team would be free to refine their specializations and to contribute their competence to all students in the group while serving as consultants to team associates.

5. Such necessary chores as record keeping, testing, checking papers; supervision of halls, playground, lunch rooms; obtaining and making available instructional resources; and other

kinds of educational housekeeping can be assigned to non-certified team personnel to free professional members for professional responsibilities.

6. Various professional talents of members of the team can be pooled to diagnose students' strengths and weaknesses and to prescribe appropriate educational programs.

7. The creation of differentiated staff assignments for teachers would make possible advancement from one professional level to another as competence is achieved.

8. Resources such as closed circuit or nationally released television lessons can easily be utilized by the large sized learning group with supplementary follow-up provided by members of the team in smaller sub-groups.

9. Greater opportunity is provided to group students according to such traits as interests, instructional requirements, special talents, for short periods of time, without loss of the benefits that heterogeneity may provide.

Learning Laboratories

Learning laboratories are not new to elementary and secondary schools. Their genesis is found in the stimulating settings for learning that have been produced when creative teachers bring into their classrooms such resources as: Reference books, periodical and newspaper articles, maps, globes, charts, pictures, films, filmstrips, slides, bulletin board displays, scientific equipment, art supplies, craft tools, records, tape recordings, and various types of exhibits. Able elementary and secondary school teachers have long maintained types of learning laboratories.

With the introduction of the laboratory method as a teaching procedure in secondary schools, first in the fields of science, industrial arts, agriculture, home economics and art, and later with adaptations being made to the social studies, English, mathematics, speech, physical education, and business education, conceptions of the environment suited to school learning underwent substantial change. Such developments were paralleled by new theories of teaching that placed emphasis upon the student--his self-direction, and shared cooperation with classmates in the planning of learning experiences--rather than on the teacher as the center of attention in the classroom. As the lecture and recitation were replaced by methods of instruction that motivated students to engage in self-discovery and evaluation, the value of learning laboratories to such enterprises were readily apparent.

Nature of the Learning Laboratory.

Recent experiments with learning laboratories have attempted to bring to students resources that are uniquely adapted to individual differences in rate, capacity and maturity. They have been carried on primarily in such fields as foreign language, business education, speech, mathematics and science. One resource that is being used with remarkable success in a number of these laboratories is the tape recorder. In Wisconsin, for example, students in shorthand classes may tune their earphones to a desired speed of dictation that is available on pre-recorded tapes in the classroom control center.[3]

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(3) Jules M. Rosenthal, "East High School Tries Electronic Shorthand," Wisconsin State Journal, February 28, 1960.

As dictation and transcription go on at various rates, with each student working at his maximum speed, the teacher is free to provide individual assistance to pupils who need help. Tape recordings are being used in foreign language classes to provide authentic examples of pronunciation, drill in language exerciese, and opportunities for students to hear and correct their own language proficiency. Here, too, the instructor is released by the instructional help provided by the machine to give attention to individual pupils.

The basis package of this type of learning laboratory has been described as consisting of:

1. A head set for each pupil
2. Pre-recorded tapes
3. A tape recorder for each teacher
4. A control center for teacher use
5. Integrated materials

When the wide variety of audio-visual resources and teaching machines and self-testing facilities are added, the learning laboratory provides the student with a multi-dimensional approach to learning that encompasses, in addition to the printed word, sound, pictures, color, action, distance, time and repetition.

Goals of the Learning Laboratory.

Basically the learning laboratory is intended to redirect school educational procedures toward the fundamental premise: All education basically is self-education. Its goal is to create a situation in which self-education may go forward with the aid of various kinds of books and other learning materials, teaching machines, tape recordings, films, and laboratory equipment. Specifically, its objective is to:

1. Change the ratio of one teacher to thirty pupils in which one student reacts to a teacher question or passively receive communications from the teacher to a situation in which all thirty members of the class are actively participating at the same time. All members of a class may recite at the same time throughout the entire period--and each has a private tutor.

2. Adapt the rate of learning and content to individual differences.

Each student may advance as rapidly as his ability and efforts permit; the speed and quality of mastery, hence, is improved for all.

3. Provide the student with only perfect, consistent, multiple models as examples for study and mastery.

4. Reduce the fear and embarrassment to students during the early stages of learning a new language, a skill such as shorthand, or the art of public speaking.

5. Make school learning a personal, self-directed venture, with each student serving as his own critic.

6. Free the teacher from administering routine drill and recitation exercises to provide individual attention to students when they need guidance.

Types of Learning Laboratories.

1. Library--including audio-visual resources.

2. Individual study, studio and practice rooms.--reading and research, music, art, speech, picture viewing, record listening.

3. Group study and meeting rooms--provided with variety of appropriate books and other printed material; audio-visual resources, including television receivers, tape recorders, talking books; equipment, e.g. manual, scientific; mock-ups, visualizations of concepts, displays; instructional supplies--all that is needed to make possible multi-sensory approaches to learning in the subjects involved.

4. Laboratories for group creative and experimental and skill activities--for art, science, home economics, industrial arts, agriculture, vocational education, mathematics, business education.

5. Special practice and large-group activity rooms--for band, orchestra, choir, dramatics, physical education, dance.

6. Audio-visual response self-teaching laboratories--equipped with individual private stations that permit simultaneous practice and responses--to tape recorded material or other types of self-teaching machines--from all members of a group, each according to his own rate and level of mastery; e.g. for foreign language, shorthand, arithmetic, speech, English, spelling.

7. Telemation auditoriums--that permit large groups to receive simultaneous multi-sized, multi-dimensional, colored still and motion pictures, with synchronized verbal presentations--either via television or personal lecture.

8. Outdoor laboratories--forest, farms, building projects, practice

fields, various community resources.

Strengths of Learning Laboratory.

The Learning Laboratory has been producing objective evidence regarding its contributions to school progress over a decade. The increases in learning, of drill-type materials as well as other content and concepts, made possible by the addition of various audio-visual aids are becoming well established.[4]

Research carried on at the University of Wisconsin in which tele-films with related correspondence lessons consitituted the total resources of students for learning has demonstrated that with appropriate aids and correspondence teachers, satisfactory school progress can be achieved even without qualified instruction in the classroom.

The films used in the Wisconsin research project were those developed by Professor White of UCLA. They were supplemented by lessons developed by the Correspondence Study Division of the University of Wisconsin. Since these tele-films could be shown on regular motion picture equipment, students were able to manage the showing of their own lessons. In fact, most of those participating in the experimental group were attending small high schools that had no physics teacher available. The results achieved from carefully controlled research that matched experimental subjects with those in controlled or regular classes revealed:[5]

1. Students learn about as much of the content of physics traditionally included in high school physics books by use of the film as others do in regular classes.

2. Those using the film-correspondence lessons learned substantially more of the content of modern physics since they had the advantage of film presentations that were as up-to-date as knowledge itself, as contrasted to textbooks that are often out of date when first printed.

3. Students who studied by the film-correspondence method made

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(4) William H. Allen, "Audio-Visual Communication," Encyclopedia of Educational Research, (Chester W. Harris, ed.), New York: The Macmillan Company, 1960, pp. 115-137.

(5) Walter Wittich, et al., Report on the Wisconsin Physics Film Evaluation Project, Part II, Madison, Wisconsin; School of Education, University of Wisconsin, 1960.

substantially fewer errors in their assignments, problems and examinations than did those in regular classes.

4. Those studying by film-correspondence covered the high school physics course in an average of five months as compared to nine for the others.

Research on the effectiveness of language laboratories has produced the following kinds of evidence regarding their superiority over language instruction without laboratory support:[6]

1. Several Hungarian refugee students, with no knowledge of English acquired sufficient knowledge of basic English in six weeks to go right into regular college courses.
2. Far Eastern Institute at Yale University has over ten years period taught hundreds of American boys a good working knowledge of Chinese--in three months.
3. At University of Tennessee--many years of experience--first semester French completed with 100 per cent speed-up; Spanish, 40 per cent acceleration. Those in laboratory groups invariably did far better on examinations than others with no laboratory contact.
4. Wayne State Universtiy integrates Language Laboratory with 6 x 10 foot screen upon which color slides are projected. In a 50 minute period students speak approximatley 800 words of French, asking and answering questions related to the visual picture. This arrangement "places the learner of a new language in situations similar to those in which he learned his native language."
5. Studies by the U.S. Office of Education completed in 1957 lead to the conclusion that language teachers considered the language laboratory as indispensable. Their attestations included such phrases as "100 per cent improvement"; "most revolutionary development in teaching of foreign languages"; "better general pronunciation and intonation carry over to written work because we not only test oral work but make them learn to write what they practice in the laboratory"; "students make more progress and make it faster than they did before."

Many who have observed the phenomenal results that are achieved by the use of a language laboratory consider the tape-recorder as an instructional aid equal in importance with the discovery of printing.

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(6) Henry L.G. Salembier, "The Case for the Language Laboratory." *The French Review*, 33: 371-387, (February, 1960).

Experiments with the telemation auditorium that will begin at the University of Wisconsin this fall will test the value of teleprompter presentations of college courses. These will involve the projection of films, slides, video tapes, and closed circuit television projectors, in multiple pictures simultaneously on three screens to which lectures and explanations are synchronized. Teams of professors working with audio-visual specialists will develop the content organization, pictorial visualizations, and verbal sound track.[7] About 250 students will receive each lesson. Previous experimentation with telemation teaching in the armed forces revealed that such techniques increased the content retention of students while reducing by 30 per cent the time required to master a course.[8]

The Quest for Improvement

Efforts to discover ways to organize instruction and make available resources for learning in both elementary and secondary schools, that must be made in response to the demands of the times, should with wisdom seek to preserve the strengths of present procedures while remedying their weaknesses. It is generally recognized, for example, that the close relationship between the teacher and pupil as well as among students in a class group, that have characterized the individual-teacher organization, encourage a healthy climate for learning in school. This strength should not be discarded. At the same time, many teachers find providing effective instruction in all the skills and aspects of a grade level or subject beyond their training and capacity. They need and desire help without losing their relationship to a group of children . The combination plans in elementary schools that provide for specialists in certain fields to move from class to class have not always proved efficient and satisfactory. Nor have the departmentalized organizations popular at the high school and college levels brought to students the ultimate in instruction.

The concepts of the instructional team and the learning laboratory illustrate possible ways in which instruction and learning in elementary and secondary schools may be strengthened without sacrificing established values or procedures. Such new approaches must prove their superiority, however, if they are to be adopted.

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(7) Robert L. Dishon, "U.W. Professors to Try Big Scale Visual Aid," The Milwaukee Journal, Tuesday, March 15, 1960, p. 14.

(8) Education U. S. A. (March 3, 1960) p. 3.

Even so, the plan of organization followed in a particular school or for given instructional groups will depend upon the personnel available. Some teachers who are good when teaching alone may not work well as members of teams; others may gain in strength and professional skill by joining such groups. To advocate universal adoption of the instructional team pattern, should it measure up to its theoretical promise, would be as subject to error in individual situations as to maintain that the self-contained classroom plan is the only one for elementary schools to follow. Faith must be placed in the results of research rather than in advocated procedures; but even results must be applied with care and objectivity to individual school situations.

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Dr. LeRoy Good:

This concludes Section V of the seminar dealing with "The Role of Newer Media as Related To New Directions in Education." This morning we have discussed teaching machines, television, and other systems. This afternnon we will be discussing the implication of media research for learning and teaching.

Dr. LeRoy Good:

Our first catalyst this afternoon is Mr. Leslie Greenhill who will discuss "Organizing for Learning and Teaching", which as you know has implications for media research.

Mr. Greenhill was born in Melbourne, Australia and served in the Australian army as a producer of films and other training materials. His intensive drive to conduct research on the utilization of films and television for educational purposes brought him to the United States. Since 1955, he has been engaged in a wide variety of research studies at Pennsylvania State University, where he holds the title of Associate Director of the Division of Academic Research and Services.

Mr. Leslie Greenhill:

There are enormous pressures on American education at the present time. One of these pressures emanates from the population explosion which is resulting in greatly increased numbers of young people who want and need education. The large increase in births during and since World War II is already making its pressure felt in the public schools. The first flood of war babies will become of college age this year and we can expect these enrollment pressures to hit the colleges during the next year or so.

There are also pressures on education that come from the increasing extent and complexity of the fields of knowledge with which modern man must become conversant. This pressure is heightened by increasing public pressures for more instruction in such areas as science, mathematics and foreign languages--subjects in which there are relatively few well qualified teachers. In fact, the effect of the enrollment pressure on educational institutions is greatly intensified by the fact that the available and expected supply of teachers has not kept up with the population growth.

Another pressure on education relates to finances. The funds available to support educational endeavors do not seem to be keeping step with the needs, with the result that we are short of classrooms, and teachers are often seriously underpaid.

These pressures have stimulated an unprecedented amount of research on a wide range of instructional media--which is, in general, directed toward increasing the productivity of the teacher by making it possible to increase the teacher-student ratio, and at the same time, to maintain or improve the quality of learning. One might go a step further and say that much of this research is aimed at relieving the teacher of functions that can be accomplished by such instructional media as film recordings, textbooks, tape recordings and teaching machines and indeed of providing high quality instruction in situations where teachers are simply not available.

In the situation confronting us there is, in my judgment, not the slightest doubt that we must increase the ratio of students to teachers, increase the efficiency of the educational process in terms of students trained for dollars invested, conserve our teacher resources and extend them as far as possible, and yet at the same time avoid a reduction in the effectiveness of education. We would, in fact, like to obtain an increase in effectiveness. This aim of the media research might be summed up by the phrase, "quantity with quality" as President Walker of our University has expressed it.

Trends in Research on Instructional Methods

There appear to be two main lines of exploration and research which are being followed in approaching the above problem. The first is concerned with large group instruction with an emphasis on extending the best teachers to larger numbers of students. This includes the use of television, courses recorded on films, and larger classes.

The second line of research relates to the development of individual instructional techniques with considerable emphasis on self-instruction. These developments include new types of textbooks and work books (e.g. the "scrambled" or programmed textbook), teaching machines (perhaps more accurately termed programmed self-instructional devices) and learning laboratories (with a variety of instructional devices such as tapes, film strips, etc.). An admirable discussion of these developments of technology in education is given in an article by James D. Finn of the University of Southern California in the current issue of the Audio-Visual Communication Review.

It is not my task here to review in detail the results of this research. Indeed, research on such devices as teaching machines, learning laboratories and similar self-instructional methods is only just beginning and only a few dependable findings are available. There is, however, a great deal of research on techniques for large group instruction--including the use of television, filmed courses and varied sizes of classes.

The research on the effectiveness of television for instruction can be summarized as follows:

1. Televised instruction appears to be equivalent in effectiveness to face-to-face instruction with the same instructor teaching in each situation. The overwhelming majority of studies of this type have shown "no significant differences" in learning.

2. In the instances (mostly in the public schools) where differences have favored the television presentation, different teachers have been used in the comparisons, and efforts have been made to select the best teacher available for the television presentations.

3. Many different patterns of televised instruction can be used to meet various learning objectives. Some courses can be completely televised, especially for college students, others require split periods: in some courses televised instruction is supplemented with laboratory, recitation, discussion or voluntary help sessions.

4. Television has excellent distributive functions: Our best teachers, supported by above-average teaching resources, can be made available to large numbers of students--many more than could be reached in face-to-face situations.

A limited number of studies of the use of courses recorded on films indicate that students can learn facts and principles from films even in quite technical subjects--about as well as from face-to-face instruction.

Similarly, studies of varied class sizes, especially at the college level, have failed to reveal differences in learning which were related to the number of students in the groups.

These findings should not, of course, be given the extreme interpretation that large-group instruction should be used for all teaching-learning situations. Indeed, much work needs to be done on the problem of defining a wide range of teaching and learning functions and of determining how large group instruction relates to them and what complementary learning activities are necessary. There is no doubt, however, that many important teaching functions can be effectively implemented in large groups by use of these instructional media, and my principal task here is to indicate what effects the use of such media are likely to have on the organization and administration of teaching and learning.

Human Relationships

Administration-Faculty. In my experience the most important and critical factors affecting the success or failure of new instructional procedures lie in the areas of human relationships--especially relationships between administration and faculty. This is especially true when the instructional procedures are ones that increase the student-faculty ratio as is the case with the use of television, recorded courses, or large classes; or when self-instructional devices are introduced such as teaching machines. Such instructional procedures seem to threaten the security of teachers by raising the spectre of technological unemployment, or by making it necessary for the teacher to change his accustomed role for a new and perhaps strange one--a new role for which, in most instances, he was not trained. Generally speaking, administrators must of necessity seek means of increasing the productivity of teachers. Teachers, on the other hand, do not wish to see a reduction of the number of jobs in their profession; many of them are comfortable teaching small classes and do not wish to teach large classes or television courses. The possibility of their being replaced with a course recorded on film or video tape is tremendously threatening.

Thus, in introducing the use of the newer instructional media a clear and justifiable purpose should be formulated. If an administration takes an authoritarian approach and arbitrarily introduces the use of television, filmed courses or large classes to save money or to eliminate teachers, it will immediately have a serious problem on its hands and it is doubtful that the change will be accepted either by students or faculty. If, on the other hand, there is a clear need for such procedures, and if research shows that they are educationally sound when appropriately used, and if the matter is openly and frankly discussed with the faculty members affected, its acceptance is likely to be good. The educational results are also likely to be good. Not all teachers will view the innovation with enthusiasm, but many or most will accept the idea and will conscientiously support the effort.

At The Pennsylvania State University our administration has been favorably disposed to such techniques for increasing the student-teacher ratio, as a means of improving instruction, and as a means of teaching students in subject areas where we have relative shortages of teachers. However, there has been little administrative pressure on departments to adopt these techniques. Where the need is clear departments or professors have tended to adopt these techniques voluntarily. We have even had professors ask to have their entire courses recorded on film for use during the summer.

Faculty-Student. The attitude of students toward new instructional techniques is likely to be more favorable, on the whole, than that of the faculty. However, students tend to reflect the attitudes of their teachers in these matters. We have found it desirable to give students an orientation to the reasons for the use of televised instruction and to provide supplementary learning activities and inter-communication facilities from classrooms to studio. Generally speaking, if the instruction is superior the students will recognize it; if the instruction is poor the students are apt to blame the medium. They rarely blame the medium for their own failure, and when they do, they need only be confronted with their record in other courses. As a rule, students' attitudes are not a serious barrier to instructional innovations if the teaching is good.

Public Attitudes. Once one breaks down the stereotyped reactions to so called "mass education", and the traditional belief that the smaller the class the better the instruction, and produces solid evidence to show that instruction via television, for example, can be very good if properly handled, public acceptance appears to be good.

Facilities and Equipment

After the reasons and objectives for using the new instructional procedures have been thoroughly thought through and it is decided to adopt them for certain purposes, consideration must be given to facilities and equipment.

Generally, at first, television, for example, must be fitted into existing buildings. This may involve only the purchase of suitable receivers and perhaps a master antenna system. If it is intended to orginate instruction over closed-circuit television, a suitable area will have to be selected and equipped as a studio. Power will be needed for lighting; acoustical treatment of the room may be required. Suitable television equipment must be selected and installed. This equipment should be chosen in terms of the function it is to perform. It might consist of a simple industrial type television camera and a monitor or two for magnifying demonstrations in a large classroom or laboratory, or for the remote observation of certain activities. Such a system might cost from $1000 to $5000. On the other hand, for the televising of courses, a dual camera television system and film chain with provision for sending instruction to many classrooms may be required. Generally, professional vidicon television systems are most appropriate for these uses. Such a system may cost from $30,000 to $60,000, depending on the specific equipment selected and the number of television receivers required. Such professional vidicon television systems may also be used for video tape recording and for broadcasting.

Administrators generally face problems in deciding on the kind of equipment that is most appropriate for their purpose. I would like to suggest the "model" concept as an approach to solving this problem. There already exist many installations of various kinds, serving various functions. These might be regarded as "models" which can be imitated or adapted to meet specific needs. I would propose that a school or college that is planning such an installation should locate other institutions which have installed systems designed to cope with similar instructional problems. Visits by administrators and teachers to two or three such installations (certainly more than one) can be most helpful.

In the planning of new buildings thought should be given to the possible future use of some of these instructional techniques. Many provisions can be included in a building when it is constructed which facilitate the use of television, if and when it should be needed. At Penn State we now have a policy of including certain requirements in all new classroom buildings. While these are primarily for possible future use of television, they also enhance the buildings for other instructional purposes. These provisions include:

1. Acoustical tile on all ceilings. The ceilings of rooms and

hallways are furred down about a foot and the tiles are removable so that cables and other utilities can easily be installed at a later date.

2. Outlets and conduits for television receivers and intercommunication systems are provided in all classrooms. These are usually at the front and on the window side of the classrooms.

3. Fluorescent lights in classrooms are mounted against the ceilings and are on several separate circuits so that the level of illumination can be varied.

4. Venetian blinds or some other adequate control of external light are provided. (In many classrooms windows are more likely to be a nuisance than an asset). Suitable mechanical ventilation systems are also provided.

5. Certain rooms of suitable size and location are designated as possible studios, control rooms, storage, maintenance, office and instructional preparation areas. These may be used for other purposes if television is not installed. Where necessary, conduit for power lines and for coaxial cables is installed during construction.

6. There is a trend toward the inclusion of classrooms that can be varied in size by suitable folding paritions.

7. Attention is given to suitable floor covering, seating, and wall color. Thought is also given to the possibility of cable connections between buildings as well as within buildings.

A decision may have to be made as to whether the television facilities should be centralized or decentralized. At Penn State we have three major television systems and several small systems, each in a different location. Each has been installed where there appeared to be a justifiable need. This has instructional advantages in our situation, but puts a heavier burden on the operating staff. In another situation, for example where broadcasting is involved, a centralized location may be advantageous.

Attention should also be given to facilities for the production and storage of graphics, films, demonstration materials and other instructional resources.

Personnel

Along with the selection of equipment, comes the selection and training of instructional and operating personnel.

The selection of instructors to teach over television is a delicate but important matter. In fact it is crucial to the success of the operation. Ideally, after it has been decided to televise certain courses, a number of teachers who are well qualified in the subject and who are considered to be outstanding teachers, might be invited to receive some training and orientation and to "try out" for a period. We have found that it generally takes a teacher about three weeks to become adapted to the new situation. After such a trial the "best" teacher (or team of teachers) would be asked to continue.

In many public school situations this is approximately the procedure that is followed. In the college or university situation where teachers seem to have a great deal of antonomy a different procedure is likely to develop. A department may decide to offer a course over television and a professor who is considered to be outstanding in the particular subject may be invited by his colleagues or department head to teach on television. If he does so it will soon become apparent whether or not he is suited to the task. If he is suited he is likely to continue. If he is not, he will probably ask to be relieved at the end of the semester, if not before. Alternatively, a professor may volunteer himself and his course. In such circumstances we have found that when instructors are really anxious to teach their course on television they do well. Others who are reluctant at first may do well after some encouragement. Consideration has to be given to suitable compensatory and time arrangements for teachers whose "productivity" is being increased. Salary differentials (extra pay) have proved difficult to administer, but promotions for outstanding effort are usually acceptable. Released load or additional teaching credit is another form of compensation. Of course, additional time for preparation generally pays off in better teaching performance. There may be a special set of problems introduced if courses are recorded for future use. There should be a clear understanding with a teacher about financial arrangements before the recordings are made.

A supporting staff to work with television teachers is most important. These should include competent television production personnel, and teaching assistants who help prepare materials or assist in the classrooms. Students can perform some of these tasks very efficiently if adequately trained and supervised.

One or more technical persons to install and maintain equipment will be essential.

Organization of Courses and Curricula

Let us now consider the effect of the introduction of television or similar media on the organization of courses and curricula.

Courses: Generally, televised courses should be selected in terms of need. This need may stem from a shortage of competent teachers in the subject, or from the reason that television makes possible the use of teaching resources (including people) that would not be accessible to students under other circumstances. Such courses may range from foreign language to calculus, and from elementary school to university. Secondly, the pattern of course organization needs to be developed carefully. Can the course be taught entirely via television? Are supplementary learning activities or materials necessary? How should these be organized? What steps can be taken to encourage student participation? How are individual students' problems to be handled? These and similar questions need to be formulated and adequate answers found. There is some research and a good deal of experience available to help solve these problems. Joint planning between the television teacher and classroom teacher or teaching assistants will be necessary.

Scheduling: For a course to be economically feasible on television it should be scheduled by a large number of students. Indeed, one of the main reasons for using television is to extend good teaching to many pupils. This requirement generates special scheduling problems. When the instruction is broadcast it means that many schools must adjust their schedules to a common time arrangement. This seemed to impose insuperable problems at first, but gradually these have been solved. It generally happens that the televised courses are important basic courses required for many students. Thus, the school system's schedule is rebuilt around these courses. At the college level where closed-circuit television is more generally used, scheduling is not quite so difficult, but the extreme flexibility obtained by offering many small sections is no longer possible. The usual solution is to schedule one (or two) large sections of a course via television and to offer a few supplementary sections taught in the conventional way at other hours. Thus, the television sections carry the heavy load.

Curriculum Organization: One of the problems faced by many universities is the need to reorganize an over-fragmented curriculum, especially for students in the first two years of college. This is resulting in the introduction of "common years" with a range of required courses and a few electives, and so planned as to give students a solid foundation, and to maximize the ease with which they can transfer to different specialties in their junior and senior years.

This arrangement results in a number of basic courses which are required for all or most students. Such a situation is a "natural" for television, or eventually, in some areas, for instruction which is carefully planned and recorded on film or video tape.

Another aspect of curriculum organization which is likely to be possible is the exchange of recorded courses between schools or between colleges both within a state and nationally (or ever inter-nationally). As was mentioned earlier such recorded instruction may need to be supplemented by other learning activities.

Finances

Let us now turn to some financial considerations. The use of television is usually justified financially on the basis of extending good instruction to large numbers of students or of improving the quality of instruction. There is a good deal of evidence to show that television can effectively extend good instruction to large numbers of students in widely scattered locations, and is economically feasible if sufficient numbers of students are enrolled in the courses. The cutting point for costs when televised instruction is compared with conventional instruction depends on a number of factors including amount of utilization of the TV system, numbers of students involved, salary levels and so forth. If only one or two courses for a limited number of students are offered over a closed-circuit television system this may be very costly, but if four or five courses each enrolling 300 to 400 students are taught over this system, this is likely to result in much lower student-credit-unit costs than instruction in classes of 45 students. One Penn State cost study showed that the cost of the system itself was saved in one year.

A simple, television system costing $2000 or $3000 might well be economically justified for magnifying demonstrations in an auditorium or laboratory. Careful cost records should be kept and every effort should be made to operate the system efficiently and to use equipment and procedures that are economically feasible. In budgeting for the use of such instructional procedures not only must initial capital investments be considered but a reasonable operational budget must be provided. This should include funds for instructional materials as well as for personnel and maintenance.

Administration of Instructional Media

There are undoubtedly many ways in which instructional media can be effectively administered. If relatively small costs for equipment and personnel are involved this may be a matter for individual departments to manage. However, such an arrangment can easily get out of hand, and it may be more satisfactory to have one organization charged with the responsibility of providing, operating and maintaining instructional equipment and resources. Such an organization might best be attached to the office of the Superintendent of schools in a public school system, or to the office of the Provost, Dean of the College or Vice-President for Academic Affairs in the case of a college or university.

Also, some universities are seeing the need for an organization which will not only provide such instructional services, but which will also spearhead research on instructional problems that are confronting the university. An organization of this kind corresponds to a research and development organization in industry. Its function is to attack problems, questions and if possible improve traditional procedures, and attempt to adapt the instructional operations of the institution to meet changing needs.

Such an organization is the Division of Academic Research and Services with which I am connected at The Pennsylvania State University. Our division offers a number of services to the instructional departments of the university: television, sound motion pictures, still photography, a limited graphics service, and a range of research services. We will assist departments or faculty members in evaluating variations in their teaching methods, or to improve the tests they use, and we study various instructional matters at the request of the university senate committees. We also conduct research which we ourselves initiate on major instructional problems in higher education.

Dr. LeRoy Good:

I am sure that there will be many of you who would like to ask

Mr. Greenhill questions concerning his topic "Organizing for Learning and Teaching."

Question:

In your presentation, you referred to improving the quality of instruction through the use of television. Specifically how is this accomplished?

Mr. Greenhill:

I have reference to utilizing resources not otherwise available in the classroom to show demonstrations clearly and at the same time providing each student with a front row seat.

In the case of mathematics, there seems to be a shortage of qualified teachers. Here we have used television for improving the quality of instruction by bringing the best teachers available, to all the students. This justification has not been dreamed up by some administrator. The faculty member can see for himself the advantages of this technique.

Question:

In the experimentation at Penn State, are you concerned only with absorption of facts in the learning process?

Mr. Greenhill:

On the contrary this is only one phase of our work. We are also concerned with problem solving ability, interpretation of data, and similar factors. We often hear people say that there are certain tangibles which we don't measure. Some of these intangibles such as student attitudes, methods of instruction and faculty attitudes we try to get at.

Question:

Is there any rule of thumb that can be applied to costs concerning the use of television for large group instruction?

Mr. Greenhill:

In our institution, we generally figure that at least 200 students should be enrolled for a particular course. Further, that four sections should be conducted during the semester to break even, cost-wise. If we want to experiment with smaller numbers of students, we must maintain a higher effeciency rate with the other courses in order to break even. As far as maintenance costs are concerned, our total budget for spare parts and maintenance upkeep for operating two major systems and several smaller systems has been approximately 50,000 dollars per year. This figure also includes salaries for some production personnel.

With the professional type system, I would also suggest that $4,000 be set aside for maintenance and repair, after the first year of operation.

Question:

How is your institution handling the release time problem for faculty members who teach via television?

Mr. Greenhill:

A typical pattern has been to give double credit for teaching via television. In my estimation, this is not adequate because of the additional time needed for preparation. I would like to recommend that persons teaching on television in the fall be allowed the summer off for preparation time, and given sufficient funds for the preparation of instructional materials.

Question:

Can a television operation be established on a shoe string?

Mr. Greenhill:

Moneys should be invested for those items which pay off educationally. This demands that you should pay attention to the learning problem and do things which reinforce or encourage learning. You should not do things which only cost money or which are not educationally sound.

Dr. LeRoy Good:

Mr. Greenhill has presented us with methods by which our schools today can organize for learning and teaching. Our next catalyst, Dr. Foy Cross, will discuss "Development of Facilities and Equipment."

Dr. Cross, a native of Nebraska, did his undergraduate and graduate work in that state. He is now a Professor of Education at New York University, and travels extensively for the institution. As an active member of D.A.V.I. of the N.E.A., he is closely associated with school building construction and has written extensively in this area.

Dr. Foy Cross:

The first half of the 20th century has made obsolete the historic time tables of social evolution. In this brief time which represents but a few seconds on the face of the clock of time, man on earth has broken the pace at which he traditionally changed his ways of doing things.

Deep back in history, man and his ways changed slowly. The great-grandparents of today's adults used tools of home living from iron pots to furniture and grandfather clocks which were produced to last through the coming and going of several generations. In their day and in the days of their ancestors there was little perceptible change in everyday life from one generation to another.

Evolution of adaptation to problems of living was always active, but at first almost imperceptible. The pace of change has speeded up with the discovery and application of each new media of communication. First there were crude attempts to communicate by pictorial representation. At that point man profitted for the first time from the experience of people other than those whom he could see or hear. Then, as he learned the importance of "passing on" his experience to his progeny, man began the long, slow process of improving the media of communication.

With each breakthrough of the barriers to communication, man on earth has quickened his pace toward his goal of controlling and adapting to his environment. With each new success in improving communication, man has come closer to success in his age-old striving to change for the better to improve his lot.

Here in the mid-twentieth century, we see man at a new peak of his ability to communicate and consequently progressing more rapidly than ever before toward his unchanging goal of changing whatever in his world stands in the way of a better, more healthy, more friendly, more happy life on earth. One whose point of view is not restricted to a myopic scrutiny of the ever fewer errors and ills of society cannot but agree that with improved communication the world is getting better fast.

The very narrow windows of edited text-book history, the peep-sights of columnists on sniping missions, and the limited periscopic sightings of admirals may have presented to some a different view. Some look back on a scene on which the mileposts are dates and the landscape just one gigantic battlefield. But from the top of the towers of knowledge now available to those who demand an unrestricted view ahead as well as a clear pciture of the past, one sees among the blighted areas scarred by wars, pestilence and social ills, vast cultivated fields where man's labor for good shows promise of rich harvests.

At this session, we are considering how we may employ research in ways which will help us to reap and make best uses of this rich harvest.

First, let me make some further basic assumptions and express how I believe these basic assumptions challenge us in our research. Assumption # 1. I must assume that today's boys and girls and their sons and daughters have the right to expect a much better education than that which has been provided youth at any time in the past.

The great nations of the world have been busy not only in developing better ways of transportation, of making and distributing goods, of improving health and welfare of people, but they have also been busy in discovering and developing new and greatly improved ways of helping people learn.

An important part of our heritage is now a vastly increased and rapidly expanding body of knowledge about how people learn and about what types of learning experiences make for better life in a better world community.

Now, how do we assure today's boys and girls in school of their rightful heritage of rapidly improving educational know-how?

This is a challenge to:

1. The public. How can we as the citizens assure this heritage for our children? What do we do to make sure that our children are not less happy, less healthy, less successful in tomorrow's world because of a failure to apply today the best available educational know-how? How do we go about making sure that the teachers of our children will pass on this heritage? How do we go about making sure that the school facilities of our community will not themselves keep our children from enjoying the benefits of the best educational procedures our society has to offer? How do we protect this precious heritage of our boys and girls from the educational quacks and witchdoctors and the educationally senile citizens who attack the modern educational procedures of the 20th century?

2. The colleges for teacher preparation. What provisions for research, what college learning experiences will assure tomorrow's children that they will have teachers who know and are skilled in applying the best educational procedures? What can a college do to prepare teachers who will go on constantly looking for and learning how to apply even better educational practices as such practices are discovered in the future?

3. The teachers and administrators in our schools. How do we get up-to-date and keep up-to-date in the rapidly changing and improving practices of the education profession? What do we do with the professional charlatans and educationally subversive teachers and administrators in our own ranks? (Some teachers, some administrators, some college professors, as well as admirals and columnists, seem to be probing for the depths of ignorance with their advice on youth education.)

This is actually a challenge to all of us. Who will be at fault if our boys and girls are less well educated than we know how to educate them? Will it be a public which tolerates less than the best? Will it be colleges and universities which fail to adapt, which fail to assume their educational leadership responsibilities? Will it be members of the education profession who fail in their duty to give only the best? Or, will it perhaps be the joint fault of all of us together to cooperatively marshall all these and other community forces for the purpose of assuring our youth of its rightful heritage of education in these first years of the "universal" age?

Assumption # 2. Second, I must assume that "teaching" in the past history of formal school education has been held, for all practical purposes, to be approximately synonymous with communication. School education has been measured in terms of the effectiveness of communication of selected knowledges and skills. A school, a teacher, and pupils are in fact still measured and graded by instruments which determine only how well certain facts have been communicated.

Today's world gives promise of a new look in evaluation. A school, a teacher, and a pupil are now, more and more, being evaluated in terms of the total-behavior of the product of the school. How much more healthy is a child for having gone to school? Not how many credits does he have in health and physical education. How well does he communicate in writing and speaking? Not how many credits does he have in English. How well does he practice the principles of good citizenship? Not how did he do on the social studies tests!

How well has he learned how to learn, how confident and skilled is he in recognizing, organizing, solving everyday learning problems and in evaluating his learning results? Not how well can he remember enough of the right answers to pass the "college boards". I must assume that the society is evaluating people in terms of how healthy and well adjusted they are, how well do they get along with and respect other people, how well have they learned how to learn and to go on learning, how competent are they to recognize and solve well the problems of living in the 20th century.

This is a challenge to:

1. Again, the public. When we, the citizens, evaluate the efficiency of the schools for which we are providing, how can we be sure we get our 20th century money's worth? We have become fairly competent in evaluating the performance of a lawyer, a surgeon, a dentist, a mechanic. We know what we want and we demand evidence that we get it. But when it comes to schools, we accept a meaningless grade on a report card, a meaningless attendance record, a transcript of credits which is in turn meaningless as evidence of performance. What, instead of such instruments of "standardized mediocrity" can we use to evaluate our efforts to "educate"? How can we, for sure, find out if our boys and girls have advanced in everyday use of communication skills, in citizenship practices, in health and well-being from having gone to school? How can we determine if our boy or girl is not only admittable to college but is really ready to go to college and learn and behave in such a way as to complete and benefit from a college career?

2. The teachers and administration of our schools. How are we going to adapt our evaluation processes and our curriculum so that we

will know for sure if a boy or girl needs and profits from any one of the courses or activities in our school? Professional educators cannot serve two masters. They cannot be judged as either efficient or effective if they strive for one set of goals in their instructional procedures and are to have their work and their results evaluated by a totally different standard.

Assumption # 3. Once again man has made great breakthroughs in the field of communication. And again, we may be certain these advances must result in change and change for the better. This time we are apparently rocketing ourselves ahead to a new and most promising development in education. School education has been bogged down in its traditional systems of communicating knowledge and of passing on skills.

What we are talking about is generally referred to as automation in education. The first and, to date, the most important result of this application of this automation in education is the establishment of the fact that "machines" can communicate more efficiently and effectively than ever before a vast majority of the learning items which for generations have been communicated by traditional classroom teaching procedures.

Our assumption here is that the communication of knowledge from the information "haves" to the information " have nots" is important in the education of an on-coming generation, and now teaching machines can communicate knowledge, can "teach" skills, can establish attitudes toward information and knowledge more effectively and much more efficiently than can the classroom teacher.

The big challenge in all this is to direct the purposes and to program effectively the content of all machines and their media of instruction.

And another big, big challenge. Suppose that, by the application of teaching-learning machines, we can "teach", e.g., basic math, advanced math, reading, languages, etc., in 30 or 40% of the time now used to "teach" these subjects, and suppose that the results of teaching by machines indicate that the machine learning is all-around better than the traditional classroom teaching results? What if, in the overall, "content and skill" subjects may be "taught" in 30% of the curriculum time presently consumed by these subjects? What that is worthwhile, and this is a challenge, what will teachers (or others) do with the 70%, more or less, of present school time which is left over? What are teachers who are no longer needed as transmitters or communicators prepared to do with this extra time? What are the important learning and behavior development needs which cannot be met by machines?

Assumption # 4. Social behavior, it is generally agreed, is the resultant of the sum total of all educational forces, the "bad" as well as the "good", which play upon individuals and groups of individuals. The school is not the only place where people get educated. In fact, schools are undoubtedly less effective in changing behavior patterns than is the sum total of outside-of-school educational forces.

Another assumption is that professional educators are becoming increasingly aware of this phenomenon, that they will increasingly strive to marshall all educational resources of a community and to channel those forces effectively to obtain their maximum power for improved education of people.

The Challenge is--

How do we go about making maximum good use of the total educational resources of a community? How do we line up the educational forces which are not only in the school but in the home, in the church, in the newspapers, magazines, radio, T-V, movies, books, toys, youth gangs, etc.? By what procedures and actions do we focus the impact of these and other educational agencies on the "good" goals of our society?

From these four premises and with one further general assumption--that the challenges mentioned are or will be met by increasingly intense research and experiment--let us turn to the consideration of "the implications of media research for the development of school facilities and equipment".

May I ask some questions and point to what seem to be basic problems confronting us in the development of efficient school-learning facilities?

Why is it that we do not do as well as we know how to do in building and equipping our centers of learning? As you will recall, I am assuming that we have discovered a great fund of facts about how people learn, about what constitutes a favorable human learning environment, about what in a learning situation is most likely to produce good learning results or good behavioral changes, and about what in a learning situation is fairly certain to produce undesirable results.

Why in communities in which it is difficult to market a new model car, or a house, or a refrigerator, or a television set unless the buying public is convinced that the new model reflects the newest, the latest, the best in design, mechanics and performance; why in a society where the public demands assurance that its defense funds are spent on only the latest developments in airplanes or rockets; why in a nation whose parents seek out for their loved ones the doctors who apply the latest therapies known to science; why do people in these communities, in this nation where normally we demand only the latest in almost all other facilities, commodities and services for which we spend our money, why do we tolerate and/or demand the spending of their education dollars on obsolete school facilities and instructional practices?

Why has a profession which is charged with a large share of the responsibility of "passing on" the heritage of our nation, which is charged with the task of developing the social and physical scientists on whom our health, our happiness, our peaceful life on earth depends, which is charged with the responsibility for educating all our people in the ways of better living in a rapidly changing world, why has this profession failed to educate people about the importance of demanding schools in which these responsibilities can be carried out in the most efficient and effective ways now known to man?

And then an even more important question. How do we go about focusing all of our outside-of-school forces, which educate too, on these problems? How do we go about lining up radio and Hollywood, and television, and newspapers and magazines and book publishers, and advertising agencies on the side of those who strive for the "good"goals of education?

Neglecting reference to horror movies, masochistic comics, and sensual-impact book publishers, who seem to strive for educational goals which are vastly different from those of the schools, let us look at the confusion of purposes which must meet a student of a class in high school English when he views commercial television or listens to radio. (Reference from article in Ethical Culture Magazine, 1960.)

If, as is logically supposed by some, these "outside" influences are vastly more effective educationally than schools, maybe we should go about lining up the out-of-school education, "them mavericks", on the side of the "good guys".

The big problem is how do we in the schools together with the other agencies of our community and nation marshall our total forces, line up our total manpower to put into effect, for our generation and for those who will follow, the ever-increasing knowledge we have about how to educate people for better living?

How do we marshall forces for the building of schools which provide:

Adequate Space?

Not only space to sit, to read a book, to recite, to write a test, but space enough to work at the job of learning how to learn and to practice the skills of learning without distractions which we know decrease the efficiency with which we learn how to learn--space appropriate to the learning and practicing of the skills involved in the "group processing" of a problem, of learning and practicing the skills of independent, self-directed study and research, space for efficient individual work and space adapted to associating with and learning with large groups; space enough to permit group viewing of projected pictures and TV under optimum conditions, and space appropriate to individual use of learning machines and other individualized equipment; space which is appropriate to the application of what we now know about how to help school children and youth learn efficiently and effectively.

The scrutiny of our school-space problem may not, it probably will not, result in larger buildings. It is likely, however, to result in buildings in which room space is variable, in which tradition-bound spaces such as basket-ball centered P.E. rooms are eliminated in favor of health-development centers, in which room spaces are constantly adapted to new learnings and improved practices in the field of education.

A Room Air Climate Favorable to Health and Learning?

We now know enough about the effect on humans of "comfort", distraction, temperature, humidity and the like to realize that an uncomfortable, distracting environment in schools does not produce the best learning conditions. We know how to build school plants which provide air climate which favors health and efficient learning.

A Good "Sound" Environment?

1. Sound insulation, sound isolation.
2. Favorable hearing and listening conditions.
3. Research in sound.
4. New demands by automation.

A Good "Sight" Environment?

1. Favorable adaptation to widening variety of eye-centered tasks.
2. Eyesight conservation.
3. Research on light control.
4. New demands.

Adequate and Adaptable Electric Power Supply and Specialized Wiring?

New demands of "automation".

How do we marshall forces for the purpose of assuring that instructional equipment will keep pace with the front lines of the best "know-how" about efficient and effective teaching and learning?

New Demands on Classroom Furniture and Equipment?

1. Traditional methods reflected in present classroom furniture.
2. Furniture adaptable to new media, and to new teacher-learner relationships.

One of the weaknesses of the profession has been our tendency to "plateau-ize".

3. Reference here to three levels of action commonly found in our approach to the problem of meeting new demands. (1940 Yearbook of ACE), i.e.:
    a. the "rear guard" action of tradition bound educators.
    b. the imitative actions of those who break with tradition but go no further than their attempts to copy procedures

of others who have broken with tradition.

c. the constructive action of those who seek to apply "the best that is known" about educational practice regardless of what others are doing.

4. Reference to dangers in well-funded attempts to "demonstrate" (e.g., many Ford Foundation projects) an idea of how to apply new knowledges, new facilities, etc.

5. Challenge to experiment, with an open mind, with all new proposals of ways to increase the efficiency and effectiveness of school-centered procedures.

Summary of proposals for research of efficiency and effectiveness of new procedures, new facilities, and equipment.

Dr. LeRoy Good:

Dr. Cross has given us food for thought with reference to ways and means of developing facilities and procuring equipment to meet the needs of modern education.

Question:

Would you consider building new schools with permanent walls or do you believe it would be more advisable to construct a shell in which the walls are added?

Dr. Cross:

We must build into our buildings as much flexibility as possible. I am also assuming that in the buildings which are currently under construction you are not going to be able to make changes rapidly. If you build large study hall type rooms for television or for the use of motion pictures you are not going to be building into that school the flexibility necessary in the classrooms of tomorrow.

Question:

You stated that there was a difference between communications and teaching, could you please elaborate on this point?

Dr. Cross:

Communication is just one part of a teachers job in a teaching-learning situation. There are other phases including action and interaction, such as the application and use of things which have been communicated in the past. If teaching is only communications, machines and automation can do this job more effectively than the teacher. It is my opinion that teaching is much more comprehensive than communication.

Dr. LeRoy Good:

The third and final presentation of this series will be given by Dr. Kenneth Oberholtzer who will discuss "The Utilization of Teachers."

Dr. Oberholtzer is one of the foremost public school superintendents in the United States. His school system in Denver has received widespread recognition for providing solid education for both youth and adults, while at the same time experimenting boldly with new methods and techniques. The educational television KRMA, for which his school system is the licensee, has been one of the pioneers in developing sound educational programming.

Dr. Kenneth Oberholtzer:

For the purpose of this discussion I should like to restate the subject as follows: What are the implications of media research for the assignment and work of teachers? Furthermore, I shall limit my discussion primarily to the electronic media, especially to television, and to the uses of such media by teachers. I believe that a helpful sense of direction can be obtained from the following statement quoted from "A Report of the Seminar On the Uses of Television in Education Conducted by the Subcommittee on Television of the Commission on Research and Service." This seminar was held by the North Central Association of Colleges and Secondary Schools in Chicago on December 3-6, 1959.

"The responsibility of educators is to employ the facility of television to achieve the goals of education more effectively."

"Television does not modify the recognized goals of education, nor does it require the elimination of the classroom even as the advent of the book did not mean the elimination of the teacher. Rather, it suggests alternative techniques for reaching the same goals. Television holds promise of raising the effectiveness of the process of bringing the mind of the teacher and the mind of the student to bear jointly on those matters deemed to be consistent with the goals of education for the community concerned."

"Television is not a self-contained educational entity, but an instrument which is significant only in the particular educational context in which it is employed; therefore, optimum realization of television's potential can result only from an integration of the teaching arts, the graphic arts, and the electronics communication process."

Whether we are talking about television, radio, teaching machines, or other media, we must recognize that the teacher's relation to the use of the media is central.

What are the principal situations in which teachers may work in connection with these newer media, and what are the implications of media research for such situations?

There are eleven categories of such situations which I have chosen for discussion. First, teachers in the studio of the television station or the radio station have an important role to play in both the use of the media and research in the media. There are two general roles that the studio teacher may play. One is as a principal teacher in the presentation of a subject or experience, and the other is as a supplementary teacher or an enrichment teacher. There are several questions that need research in the matter of how teachers in the studio may use television, such as, the question of whether a large number of visuals should be used, of whether students should be used in the studio, of how to select the teachers, of how long a presentation to give, and the like. Presently, we are conducting some action research on these matters in our own system with the use of juries of teachers. A rather large amount of this action research is going on in cities over the country, but there is little effective means of assembling and distributing it at the present time. This is one realm in which I think we might make a step forward and contribute to better uses of the media. In other words, we need reports on both carefully structured research and on action research.

A second category in the use of media lies in the uses that teachers make of it in the classrooms. We have assumed that most of the instruction for elementary and secondary pupils at least would take place in the classroom where the television receiver was placed for the lesson or experience. This is not true for all programs, but for a substantial part of them. Where this is done, that is, where there is a classroom teacher involved together with the studio teacher, we get into the matter of relationships of the two teachers as well as the relationship of subject matter and experiences to be involved.

A third type of situation involves the assignment of teachers in teams. One of our most interesting experiences in Denver has been in the teaching of foreign languages in elementary schools where we have a principal teacher in the television studio and supplementary or enrichment teachers in the classrooms. Our experience would indicate that in many instances with an expert teacher in the studio we can have a much less well prepared teacher in foreign languages in the classroom and still produce excellent results, in fact, sometimes better results than where we have presumably well prepared teachers in the classrooms. This arises because of the differences of views as to how languages should be taught. We are endeavoring to determine what kinds of activities in the classroom are most suitable to complement those directed by the television teacher. This involves the matter of working relationships, as between the television teacher and the classroom teacher, the matter of instructions to teachers and to pupils, the use of supplementary materials, and the like. There are many other kinds of team teaching that can be contrived in the use of television, especially under closed-circuit conditions, where a principal teacher in one classroom may present a subject to be viewed in several other classrooms in the same buildings and where teachers or teacher aides are present. We have not had direct experience with this in Denver, but there are several reports on such activities, as, for example, in the case of the Township High School of Evanston, Illinois. These newer media have brought an exciting new element into the practices of team teaching, including an effective means of improving instruction and of providing at the same time in-service instruction for teachers themselves.

A fourth type of situation is the assignment of teachers as counselors. Dean Thomas C. Pollack of the College of Arts and Sciences at New York University has argued for a concept of the university teacher or instructor as a counselor rather than as a teacher of large groups in a given classroom. He cites the example of the British university where the personal relationship of learner and teacher is in a much more intimate setting than in the large classroom setting of the typical American university. Our concept, arising from the initial example of Harvard, is one of teachers working with groups of students. Pollack has proposed instead that there be a master teacher on television who would present the subject, and that the pupils would work in libraries or in their own homes, consulting counselors from time to time regarding progress in their work. We have carried out a similar idea regarding some phases of adult education in Denver. Our station KRMA-TV, Channel 6, was established primarily to afford adult education opportunities to an increasing number of people in our community. We were faced with the alternative of either expanding greatly our physical facilities through the usual classroom procedures or finding a substitute for this kind of expansion, and we did find this in the use of television that was available to students in their homes by open-circuit operations. Likewise, on our Boettcher School of the Air, which is presented over KRMA-TV to elementary pupils, we have the principal teacher in the studio who instructs the children who have television receivers in their homes. The children are then visited by teachers who act as counselors to them individually, following up and supplementing the work of the television teacher.

A fifth role for teachers is one as evaluators. I cite two examples, again from the experience that we have had in teaching foreign languages to elementary school pupils. First is the relationship of the studio teacher to the classroom teachers, and vice versa. The classroom teachers are able to provide evaluations of the work of the studio teacher and to send in suggestions to them from time to time. Likewise, the studio teacher visits in the classrooms and is able to help the teacher appraise the results of the teaching there. We have found another means of evaluation that we do not ordinarily use, and that is the use of a jury of teachers to visit in classrooms to conduct examinations of a sampling of pupils in order to ascertain progress in learning the language. This is a rather expensive and slow process, so we are now thinking in terms of another kind of evaluation where the teacher would have a scale to apply, similar to a handwriting scale, which would enable him to classify pupils more readily, that is, in terms of their achievement in the spoken language. Thus the use of this new media has stimulated our inquiry into newer and other kinds of evaluation procedures.

A sixth involvement is with teachers as curriculum consultants. Regardless of the kind of media used, the heart of the matter is the teacher and the programming that is used. The teacher must have a knowledge of the subject matter and of the curriculum, and must be able to present it a little differently over television, for example, than she would normally do in the case of the usual classroom presentation. A rather uniform reaction from teachers who have presented materials over television is that they spend a great deal more time in the organization of their teaching materials than they do in the usual situation. And so, we have the questions here of the kinds of materials to use and the kinds of consultants to involve. We have involved not only school teachers but university consultants as well in subject matter more frequently than previously because of this more careful organization of materials.

A seventh situation involving assignments of teachers is in the matter of relationship to teacher aides, technicians, and assistants. Because of the use of the principal teacher in the television studio, it is now feasible with at least a more mature learner group, probably with high school, college, and adult groups, to provide assistants or aides rather than teachers in each instance. Among the aides, technicians, or assistants is another group, writers and producers with whom teachers do not normally associate. In other words, teachers become involved in both subject matter and in techniques with other people in their classroom or teaching situation in a manner that has not been typical in the usual classroom situation. They learn of the techniques or skills in the graphic arts, for example.

Eighth is a situation where teachers are involved with community resource persons. One of our most valuable community resources is parents. When we started our telecasting over Channel 6 in Denver, we provided it entirely in the evening hours where no classroom teachers were involved. We found a very ready acceptance of the challenge of learning in the home and a most valued resource for the learning experience in the parents. Likewise, in getting into many new fields of interest for adults we have uncovered talent and ability in persons in our community that we really did not know resided there before. They have been involved in developing programs to be presented over television and have thus become an effective resource that would not be known in the usual classroom teaching school operation.

A ninth situation involves teachers and machines. Much has been said about the use of machines in this conference, and I come back again to the point that a teacher is still central to the matter of the use of machines and to programming. The machine does not work by itself. While there must be a considerable amount of experimentation and research as to the most effective kinds of machines, we are involved also with teachers and the development of programs as the most important matter.

A tenth involvement is with teachers and motivation. This arises particularly in the use of television because children spend so much time viewing commercial television where the principal ingredient is entertainment. One of the problems here is to overcome the casual habits of viewing and to encourage, for example, a greater degree of concentration. Television has given us a new sense of the importance of the proper kinds of motivation of children in order to get them into the mood for learning and to concentrate on the subject at hand.

The eleventh is the matter of the teachers and the use of the media in the total teaching situation. From the outset there has been an inertia and in some instances a fear about the use of the newer media, especially of television. To overcome this we have involved teachers and parents in visits to the studio and in other ways have enabled them to see what goes into a television production. Learning doesn't take place just in school, of course. It takes place in many situations. Television can stimulate learning activities outside of the classroom, for example. We discovered that when certain courses and subjects were offered over television there was a much increased use of some reading materials in the public library. In fact, our encouragement of reading on one of our series of programs caused a marked increase in the use of some of our community libraries where the circulation had been rather static.

Question:

Would you explain your home foreign language teaching by television in greater detail?

Dr. Oberholtzer:

We started with the assumption that we would need teachers with foreign language preparation equivalent to North Central Association requirements, or at least with a considerable number of hours of a foreign language. We have found that some knowledge is desirable, but that teachers with limited preparation in a language and with the help of an expert teacher on television frequently come out with as good results as those teachers who have considerable preparation. There seems to be less conflict of views about teaching methods and ways by which the material may be presented.

Question:

What is the background of the teacher in the foreign languages?

Dr. Oberholtzer:

The expert TV teacher is well prepared in the teaching of foreign languages and has had considerable experience in the classroom.

Question:

How do you screen teachers for TV teaching? Are there minimum qualifications?

Dr. Oberholtzer:

We are faced with different selection problems in elementary and secondary schools because the North Central Association requirements apply to secondary schools only. In screening or selecting the TV teachers, we first look at their college records. Secondly, teachers are selected on the basis of performance before a TV camera and a jury of observers. There are two types of juries. One is a group of their peers. The other is a group of consultants who are selected from university faculties. These two juries recommend.

Question:

Do teachers volunteer to become TV teachers?

Dr. Oberholtzer:

Thus far we have had a sufficient number of volunteers to select from for any given program.

Question:

Are they on the same salary schedule?

Dr. Oberholtzer:

Yes, they are; however, they do get some additional pay, as do other teachers, for additional time. In the final analysis they end up with greater compensation.

Dr. LeRoy Good:

Dr. Oberholtzer has presented a vivid picture of the problem of teacher utilization.

GROUP REPORTS--Tuesday, April 12

Dr. LeRoy Good, Seminar Co-Chairman:

Tonight we will have reports from the six discussion groups about their thoughts regarding today's presentations.

Group 1:

Our group discussed the problems of bridging the gap between the researcher and the practitioner. We came to the conclusion that this gap must be bridged, but that we could not accomplish this by only reaching administrators or faculty members in the college of education. We agreed that research findings must be utilized through a process of involvement. Such involvement includes people in the community along with the teachers, colleges of education and administrators. Many of our group felt that there was a great deal of information concerning research, but that no one was really paying much attention to it.

There is a need for changing the attitudes on the part of everyone involved in education to make more use of research findings. We must create the desire to find out more about the application of these findings to specific educational problems. One specific suggestion was made relative to this problem. Teachers, school board members and superintendents should get together and discuss different research findings which would apply to the local situation.

Several suggestions were made concerning types of research needed in the field. These were:

1. Specific rather than general evaluation of the effectiveness of television in education.

2. Study of content materials rather than particular techniques in education.

3. Study of the difference between total television teaching and supplementary television instruction.

4. Further study of the effective utilization of television in the classroom.

5. Study of methods for visualizing research findings because visualization is acceptable and usable by the reader.

Group 2:

Our group began by making a recommendation to the speakers; namely, that the speakers should define their terms as one does in formal research.

There was considerable discussion about what research really is and how it should be conducted. We felt that there was a need for more team teaching and experimentation with this technique. Our group also felt that all of us should take a hard look at how we are currently using audio-visual methods and techniques in our own communities. We recommend that audio-visual materials should be developed to assist with the teaching of the basic concepts of education. We also recommend that this seminar consider the principle of learning in their discussions.... and not theories of learning. If we bring proven methods of instruction into play, then learning has really taken place. The group concluded that we must convince everyone that the almighty power of the word is not as powerful as we think. By the same token, however, the printed work is the most universally accepted method of communication in education, therefore we must first have a good understanding of the use of the older media (the printed word) before we can have a clear understanding of the use and the power of the newer media.

Group 3:

We feel that this particular seminar needs wide dissemination. In many instances, teachers will gain as much practical knowledge from our discussion here, as they will from research findings. Additional types of information needed for dissemination are cost figures from various types of school districts and predictions on costs for a school or college to enter a completely oriented program. It was felt that more practical articles in teachers magazines and journals might do more at this stage than would requests for additional research projects and ideas. A strong plea was made for more creative thinking on the problems of dissemination. Our group was concerned with the dissemination, not only of technical and research data, but of operational data regarding specific programs and costs.

Group 4:

We discussed Dr. Oberholtzer's presentation, and wondered whether he had any research findings concerning his educational TV teachers. The group was interested in the teacher in the classroom who has no formal training in television or as a member of a team. This presented the problem of preservice and inservice teaching with the newer media of communication. Our attention was then directed to the utilization of space in the average classroom. What is going to be the ramification of television in terms of the space utilization in the future?

Group 5:

Our discussion centered around teaching machines and we considered five questions:

1. What is a teaching machine?

2. Can teaching machines be used for various types of content material?

3. Can teaching machines replace teachers and textbooks completely?

4. Do we have enough information to sell the school boards on these devices?

5. How can we better prepare teachers to work with these machines?

We concluded that we must first define our terms. Secondly, we agreed that although teaching machines can be used for a variety of different purposes, they will never replace the creative teacher. They might also develop side effects which are not desirable in the teaching situation. At the present time there is not enough research information regarding their use to sell our school boards. However, we felt that teachers need extra training in machine operation and the development of programs for these machines. This might be handled both through teacher training institutions and inservice training programs.

Group 6:

Our discussion centered around open-circuit television. We concluded that this newer media can be effectively utilized in the teaching program.

Wednesday, April 13.

Dr. Robert de Kieffer:

Our catalyst this morning is Dr. William Allen who will discuss "Areas of Needed Research".

As the Director of Research in the Department of Cinema at the University of Southern California, Dr. Allen has had a wide and varied background in Communications Research. He is also the editor of Audio-Visual Communication Review, the research journal of the Department of Audio-Visual Instruction of the N.E.A. Formerly he was Advisor on communications for the Rand Corporation and the System Development Corporation.

Dr. William H. Allen:

We have heard a great deal in the past two years about areas of research and areas where research is needed. My presentation will be organized into four parts. First, a few introductory remarks. Second, the application of our research knowledge. Third, the status of research and the most important needs. And, fourth, a one man's classification of current research projects that have already been funded.

We don't need to be reminded that many serious educational problems are facing us. We are now looking for ways to make the best use of research in finding answers to these problems. Our particular attention is here directed to the problem of the newer educational media, namely motion picture films, television, and teaching machines.

I would like to suggest that we need also to include consideration of the technology development of the future--those inventions and discoveries presently beyond our knowledge. These devices may be sooner coming than we think. It is a rather sobering thought to recall that almost as recently as a year ago the term, "teaching machine", had not even appeared in the educational literature. But, you know, the teaching machine is now the hottest item in the pedagogical market place. Therefore, when I include the as yet undiscovered or undeveloped media, I am including those things which are predictable but not definable. We will have them but we do not know what they are. If we look at the history of technological development in the past 10 years alone, we discover the tremendous impact technology has made upon our society. This is clearly demonstrated in the January, 1959, issue of Fortune magazine. In this are listed 78 scientific and technological advances made during the 1950's. The interesting thing to note is that 24% of these were achieved sooner than predicted, and included such things as the nuclear-powered submarine, earth satellites, and video tape recording. (This latter instrument, one of the greatest technological triumphs in the recording of sight and sound, only four years old, is already being challenged by a new recording medium-thermoplastic tape.)

It is interesting to observe that 18% of these discoveries and developments had not even been predicted. This same chart makes a prediction for the 1960's, several of which have implications for the communication fields. These are the machine translations of languages, a new family of ultra high freguency computers, the understanding of the aging process, and mural television screens. These developments may have far reaching significance in the future of education.

Looking back over the research in this field for the past 40 years, it is apparent that application of communication research to education has been greatly accelerated. Where it took the instructional motion picture 25 years to be accepted as a valid teaching instrument, instructional television will probably be able to achieve this position in six to seven years. The teaching machine may achieve this feat in two to three years. The time spand for exceptance of a new medium of instruction and its period of justification is being shortened dramatically with each new discovery. We are rapidly moving from a challenge given us in the past--"Prove it will work"-- to one of, "Tell us how to use this instructional medium." The strong resistances to change and innovation are being broken down.

Applications of Research Knowledge.

There are five different consumers of research knowledge in audio-visual communications--the researcher, the audio-visual specialist, the administrators, the teachers; and the public.

A researcher's need for research knowledge is great. He must have considerable knowledge of unadulturated research studies which are currently under way. These people, if they are serious research workers, know the source of research information. The audio-visual, or communication specialist, those who specialize in the communication media, including producers of instructional material. The administrators include administrators from the elementary school principal to the university president. The teacher is in the pay off position as far as research goes. These are the people who apply the research in the classroom. Finally, there is the public, those who need only a knowledge of research in its most generalized form.

As the need for research and research knowledge decreases (as we go from researcher to the public), the number of users of this knowledge increases. We have a requirement to distill and generalize research information for greater and greater numbers of uses. Research needs to be put in a form of practicable applications. This is a problem for dissemination.

Research Status and Needs.

Let us now consider the research needs of three of those groups of research consumers-the teachers, the administrators, and the communication specialists.

Teachers have a basic need for research findings which are related to the utilization of materials in the classroom. Some real research progress has been made in the last 40 years in identifying the factors leading to the more effective use of newer media. With reference to a few specific needs for research, I suggest that we need research using a combination of several kinds of media. We need to know more about audience learner characteristics and there relationship to learning. We need to know the effect on learning of the classroom environment.

The administrator needs to be familiar with the research on utilization techniques as well. In addition, he must know the effectiveness of different kinds of media. In evaluating the research data in this area, I would say that we have ample comparative effectiveness research to show that the educational media can teach factual information. However, not enough information is at hand to tell us the ways each of these media is unique as a teaching tool, or their effectiveness in teaching the different kinds of learning skills, and with different kinds of learning objectives. We lack a fundimental knowledge of their effectiveness in every area but the most elementary ones. The research with film and television has predominated these studies. It seems to me that it might be a gross waste of money to continue our effort in this direction.

No real research has been conducted to discover desirable administrative practices and the techniques of teacher education. There is a need for investigation of the many ways of operating and supervising educational media programs at all educational levels. Consideration should also be given to the financing of television and other learning systems.

Now let us turn to the third group--the communication specialists. Again, this person needs to have a knowledge of utilization, effectiveness, and administrative research. In addition, he has two other needs. The first deals with the production design of educational communication media. There is considerable research evidence available, particularly that of the film research program at Pennsylvania State University. We know, for example, that certain improvements can be built into audio-visual instructional materials such as motion picture films, to increase their teaching value. Space limitation here prevents a specific listing of these types of research; however, we do have some set of guidelines that will help us do a better job of producing instructional materials. Although a start has been made concerning production variable unique to television presentations, there is much less evidence available on this subject.

Finally, the communication specialist needs to develop a basic theory of instructional communications. There currently is a lack of a sound theoretical base in audio-visual communications.

There are four broad research considerations which need further action. First, we need to avoid research that duplicates previous research. Although it is true that some research does not need replication, there is ample evidence, for example, regarding the effectiveness of television and motion pictures when compared with conventional instructional techniques. Television, particularly, in large-scale studies, has devoted almost its total effort to research of this kind. It would be wasteful to continue these comparitive effectiveness studies at this time.

Second, research using combinations of media as parts of total instructional should be encouraged. In the past the media have been studied in isolation, not in combination. This has been particularly true with television and film research. Because of the probability that different media make different contributions to learning, we would expect more fruitful results of their use in combination. As parts of learning systems all these media should be brought to bear upon the solution of instructional problems. In the communications media family, there are three types of specialists. There are the audio-visual people who are largely following the film line; there are the educational television broadcasters who are going down the television route; and there are the psychologists who are concentrating on the teaching machine. As yet, there is little communication among these three groups, cooperating to apply all instructional media to the improvement of instruction.

Third, we need research on broad educational problems. Total segments of the curriculum and/or total educational systems should be studied on the assumption that the use of educational media will improve instruction. It seems imperative that these media should be applied on a large enough scale to bring about major changes in our educational system. This means that they might be integrated into the teaching of science, math, modern foreign language, etc. in all grades. Or they might be applied to such problems as teaching the gifted child or the instruction of critical subjects. We need to discover their contributions when they are totally incorporated into all instructional elements of the single school system or of an institution.

Four, major consideration must be given to the needs for large-scale programs of research. We are now doing research in bits and pieces. This is the dissertation approach. Much of the research being reported under Title VII is of this kind. It is dependent upon the individual development of the project. What we really need are large-scale research programs, probably located in research centers throughout the country. Out of these large-scale studies could come demonstrations concerning the applications of communications media in instruction. With these large research centers and programs, we would get the kind of high professional and public visibility that the single little study could not hope to receive.

Classification of Current Title VII Projects

I would like to close by reviewing with you a classification of the 85 Title VII projects currently in progress. This is one type of classification, and a mechanical one, based on a media orientation (See table showing Title VII Research of Educational Media). However, it does show the scope of the program and areas in which Title VII grants have been made. You will notice that projects studying television variables predominate and that nearly half the projects compare the effectiveness of media with more conventional instructional methods. Dispite the fact that we have most research evidence in this area, this is still the largest single area of research attention. At the same time we notice a lack of research attention to more readily available media, such as filmstrips and flat pictures to the administration of audio-visual programs, and to the use of these media as testing tools.

Question:

Is there a need for audio-visual education theory as differentiated from perception or the theory of psychology, which seems to underlie all communication?

Dr. Allen:

Obviously the audio-visual educational theory has to draw heavily from the other disciplines. Our failure has been in our inability to develop a useable theory related to the instructional use of educational communication media, either as a part of other learning theories or as a special theory itself. Actually, we have just neglected to look at this problem in any extensive way. It is interesting to note that Neal Miller at Yale has developed a rather comprehensive application of his motivation-cue-responce-reward theory to the communication field in an issue of AV Communications Review called "Graphic Communications and the Crisis in Education." To my knowledge, this is the only attempt to fit the educational media into a learning theory.

Question:

Should we sacrifice research on teaching machines for research with media used in combination?

Dr. Allen:

Not at all. It isn't either-or. The teaching machine is so new we need considerable knowledge of its instructional potentialities that only research can give us. However, I feel, also, that we must make a more systematic attack on the communication system point of view, using combinations of media. These media should ve used in relationship to the educational objectives of learning and teaching rather than as isolated media attempting to carry the entire instructional load as individual media.

TITLE VII RESEARCH ON EDUCATIONAL MEDIA

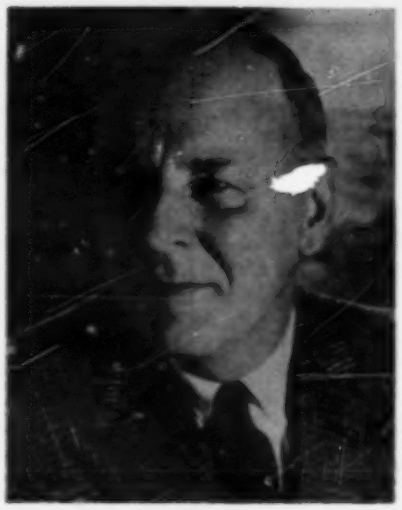
(Compared by Media)

	Comparative Effective-ness	Classroom Use	Teacher Education	Adminis-trat.	Production Design	Testing	TOTAL
Combined Media	11	2	4	1	1		19
Motion Pictures	9	2	3	1	4		19
Television	18	4	11	2	2		37
Video Tape Recording Kinescope	3		7				10
Self-Teaching Devices	7	3			3		13
Filmstrip-Slide	1		1		2	1	5
Flat Pictures	1						1
Recordings-Radio	4	1	3				8
Other Media	1						1
TOTAL	55	12	29	4	12	1	113

Numbers indicate comparisons in Title VII projects through October, 1959.

Dr. Robert de Kieffer:

Our final catalyst, Dr. Kenneth Anderson is the clean-up man. He will discuss "Implementing Research Into Action."



A native Minninnsotan, Dr. Anderson received his undergraduate and graduate degrees in that state. As dean of the School of Education at the University of Kansas, he has been very active in Educational research and is the current president of the new national council for Research in Education.

Dr. Kenneth Anderson:

In a population which is so dependent on research, it is sad to reflect how few people perceive what it is all about. Research is an approach to a comprehension of the universe along a broad thoroughfare of organized knowledge solidly established on observation and experiment imbedded in a matrix of theory. It is a highway that is continuously being lengthened, widened, and mended.[1]

Whether or not we agree with Johnson's definition of research in whole or in part, most of us would agree that few persons know what it is all about. Herein lies the basic problem of implementing research into action. Too few of those who do research, work on important problems, employ good designs, and generalize within the limits of their investigation. It is no wonder, therefore, that the consumers of research fail to implement the research into action--too often there is nothing to implement. Furthermore, "distinguishing between good and poor research on an overall basis is difficult to accomplish and to communicate."[2] To communicate with success with regard to the above demands a frame of reference or a set of evaluative criteria by which judgments might be made.

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*Address given at the Research Seminar of the Mountain-Plains states on the National Defense Education Act, Title VII, at the University of Colorado, April 11-13, 1960.

[1] Palmer O. Johnson. "Introductory Remarks at Opening of the Symposium on Educational Research." First Annual Phi Delta Kappa Symposium on Educational Research, Phi Delta Kappa, Inc., Bloomington, Indiana.p. XV.

Since Title VII is concerned with research programs leading to the improved use of audio-visual material and since most of the recent endeavors along this line have been in the area of science, for example the Encyclopaedia Britannica films in physics and chemistry, it seems appropriate to cite the criteria established by the National Association for Research in Science Teaching for judging the worth of research investigations in science education.

What Constitutes a Research Investigation in Science Education?

The Overall Committee on Research of the National Association for Research in Science Teaching presents the following set of criteria for identifying research investigations in the teaching of science:

In order to be classed as a research investigation, a study must satisfy the criteria in one of three categories: A. Experimental studies. B. Analytic studies. C. Synthetic studies.

A. Experimental studies include comparisons of learning under different methods or conditions of teaching and all other investigations that involve pupils in one or more types of learning situations. They are characterized generally by the following steps or techniques:

1. A statement of a carefully and specifically defined and delimited problem.
2. A thorough study of the literature appertaining to the problem, for the purpose of determining the need for the study and its possible contribution.
3. The development and use of an appropriate experimental design.
4. The collection of data and their treatment by appropriate statistical techniques.
5. A presentation of the findings and of the conclusions that seem justified by them.

B. Analytical studies are systematic attempts to determine from published materials, cooperating teachers, field studies, and other sources such factors as the aims that govern or that should govern the teaching, subject-matter elements that are taught, the relative importance of topics, facilities needed for teaching, and the like. Analytical studies are characterized generally by the following steps or techniques:

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[2] Nicholas A. Fattu. "A Survey of Educational Research at Selected Universities." *Op. cit.*, p. 16.

1. A statement of a carefully and specifically defined and delimited problem.

2. A thorough study of the literature appertaining to the problem, for the purpose of determining the need for the study and its possible contribution.

3. A selection or invention of a technique appropriate to the problem and also one that provides means by which the validity and the reliability of analysis may be determined and maintained.

4. A presentation of the findings and of the conclusions that seem justified by them.

C. Synthetic studies are investigations in which various curricular materials, resource-use data, instructional suggestions, references, aid to teaching, and the like, are brought together into some unified pattern so as to be helpful in an educational situation. Synthetic studies are characterized generally by the following steps or techniques:

1. A statement of a carefully and clearly defined need or objective.

2. The development of criteria for maintaining selectivity in the use of materials and the consistent use of the criteria in thorough studies of materials appertaining to the need or objective.

3. The development of a practical pattern or technique for organizing the materials that met the criteria.

4. The preparation of a substantial publication that summarizes the results of the studies.[3,4]

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[3] Science Education, vol. 37, No. 1, February, 1953.

[4] Analysis of Research in the Teaching of Science, July 1956-July 1957. U. S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1960, No. 2, pp. 33-34.

Although educational research studies run the gamut as to problems studied, good studies are characterized by the identification of definite problems to be investigated. This should be no less true of research studies involving the utilization or adaptation of audio-visual media. But for what purpose? No doubt there are a host of good identifiable problems in this area needing solution, but should not the central and underlying purpose be that of the improvement of instruction? If this be the primary purpose, then the real problem is the evaluation of the outcomes of learning via audio-visual media. Evaluation then must involve objectives and an appraisal of whether or not these objectives have been reached.

What are some important objectives or criteria of learning? These may be stated in many ways but are not the following almost all-inclusive?

Has the learner:

1. Acquired and retained useful and pertinent information of a factual nature?

2. Acquired and retained a workable understanding of the principles or big ideas of an academic field?

3. Learned to use intelligent methods in adapting to the problems of his life?

4. Reached a level of understanding, application, and performance in the above three which is commensurate with his ability?

The purpose of this discussion was to point out that:

> ....evaluation must be geared to objectives along a continuum from simple understandings and skills and limited adaptability to more complete understandings and complex skills and greater adaptability. Where we as students and teachers are on this continuum determines the evaluation procedures to be employed. As long as we operate on a rather low level of understanding near the lower end of the continuum, the ordinary evaluation procedures will suffice. A little thought and ingenuity, however, can lift us off the lower levels of evaluation and place us a bit higher on the continuum. As we and our students continue to move upward in an understanding of what we are trying to accomplish, the simpler procedures will no longer evaluate adequately the transfer of understandings and abilities of the pupils.[5]

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[5] Kenneth E. Anderson and Gordon M.A. Mork. "Evaluating Science Teaching." Science for Today's Children, Thirty-Second Yearbook, Department of Elementary School Principals, National Education Association, Volume 33 (September, 1953) p. 141.

Regardless of whether or not you subscribe to the above criteria of learning in terms of a continuum or spectrum, it is imperative that the purposes of a research study be couched in terms of sound learning objectives if the research study is to have a chance of being implemented into action.

In the pamphlet entitled Analysis of Research in the Teaching of Science, published by the United States Office of Education, one study appropriate to the discussion of the conference was cited "for excellence in dealing with one or more (in some cases, all) of the following aspects of craftsmanship in educational research--choosing a significant problem, validating data, using statistical analysis, and reporting."[6] The study cited was entitled: "An Inquiry into Some Possible Learning Differentials as a Result of the Use of Sound Motion Pictures in High School Biology."[7] This study, however, was based on a previous study entitled: "Toward a More Effective Use of Sound Motion Pictures in High School Biology."[8]

The problem of this study is quoted verbatim from the article which appeared in the February 1956, issue of Science Education. It reads:

> After identification of the principles covered or stressed in the twenty films, an experimental design was developed in which films and principles were introduced into an experimental situation in order to determine the effectiveness of films in contributing to the understanding and application of principles of biological science when different teaching procedures were employed.

Three groups were established as follows:

Group I. A control group in which no films were shown or in which the teachers showed some films of their own choice.

Group II. An experimental group in which students saw the films at intervals throughout the school year. Teachers in these classes made their own preparations for the showing of the films.

Group III. An experimental group which saw the films at intervals throughout the school year bolstered by the emphasizing of the principles covered or stressed in each film. The teachers of these classes received the following directions with each film:

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[6] Op. cit., (see footnote 4) p. 38.

[7] Herbert A. Smith and Kenneth E. Anderson. "An Inquiry into Some Possible Learning Differentials as a Result of the Use of Sound Motion Pictures in High School Biology." Science Education, 42 (February, 1958) 34-37.

[8] Kenneth E. Anderson, Fred S. Montgomery, Herbert A. Smith, and Dorothy S. Anderson. "Toward a More Effective Use of Sound Motion Pictures in High School Biology." Science Education, 40 (February, 1956) 49-50.

"Enclosed are sheets listing thirty-four biological principles selected from W. Edgar Martin's list of 300 major principles of the biological sciences. You will note upon examination of the sheets that the numbers of certain biological principles are circled in black, and others in red. If the number of the principles is circled in black, that principle is covered in the film. If the number of the principle is circled in red, that principle is stressed in the film. It is important before the showing of the film that you point out the principles which will be covered in the film. Use the chalk board or other means to inform your students of the principles covered in the film. After the showing of the film, stress the biological principles in your teaching."

Thus, three groups of classes were involved as follows: Group I, the Control Group; Group II, the Film Group, and Group III, the Films-With-Principles-Stressed Group. Thus, the problem became one of testing which method produced superior results in measured achievement during the period of one school year of instruction. The design adopted required that differences which might occur in performance of the three groups were to be tested for significance by assumption of the null hypothesis.[9]

One of the interesting analyses of the data in the above study may be summarized as follows:

An interesting area of speculation in the interpretation of an experimental study is suggested by Lucow who said: "It is here suggested as a postulate in educational philosophy that greater variation in classroom achievement is evidence of the release of individual differences among pupils during the learning process." Lucow went on to say: "A change in variance from pre-test to after-test was considered to be of greater import than the change in means, under the assumption that greater variance in a group indicated greater expression of individual differences."

Which of the three methods as used in this study produced the greatest change in variance from the pre-test to the post-test? In order to answer this question, it was necessary to establish a confidence interval for the ratio of post-test variance to pre-test variance for each of the three treatment methods.[10]

The results of the above study were summarized as follows:

On the basis of the three techniques of statistical analysis used in this study, and within the limitations imposed by the tests employed, it may be concluded that:

1. No differences in achievement existed between the three

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[9] Ibid., pp. 46-47.

[10] Ibid., p. 51.

treatment groups holding intelligence test scores and pretest scores constant. This conclusion must be tempered by the fact that thirteen of the sixty groups could not be used in the analysis because of failure to meet one or more of the assumptions basic to the design of the investigation.

2. Differences in achievement existed between the treatment groups of the upper one-third in intelligence as measured and that these differences were in favor of the Group III or the Films-with-Principles-Stressed Group as contrasted to Groups II and I or the Film Group and the Control Group. The same conclusion applies for students in the lower one-third in intelligence as measured but the differences were not as marked.

3. Another index of the superiority of Method III to Methods II and I was found in the increase in variance from pre-test to post-test. Method II was superior to Method I in this same respect.

Thus, there is some evidence that the Films-with-Principles-Stressed Method yielded results somewhat superior to the Film Method, and that the Film Method yielded results somewhat superior to a conventional method as used in Control Group.[11]

Another study appropriate to the discussion of the conference was one entitled: "An Evaluation of the Introductory Physics Course on Film."[12] The problem of this study was:

> The problem was one of testing which method produced superior results in measured achievement during the period of one school year of instruction: the conventional method or the film method of instruction. The design adopted required that differences which might occur in performance of the two groups were to be tested for significance by assumption of the null hypothesis.
>
> In order to secure necessary data as a basis for a statistical test of the null hypothesis, it was decided to administer three tests as follows:
>
> 1. The Dunning Physics Test, Form Am,* as a pre-test at the beginning of the school year, 1958-59.
>
> 2. The Dunning Physics Test, Form Bm,* as a post-test at the

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[11] Ibid., pp. 52,54.

[12] Kenneth E. Anderson and Fred S. Montgomery. "An Evaluation of the Introductory Physics Course on Film." Science Education, 43 (December, 1959) 386-394.

end of the school year, 1958-59.

3. The Terman-McNemar Test of Mental Ability, Form C,* as an intelligence test during the middle of the school year, 1958-59.

*Published by the World Book Company, Yonkers-on-Hudson, New York.[13]

The three hypotheses under test in the form of questions were as follows:

1. Did the experimental classes achieve significantly more than the control classes with intelligence quotients and pre-test scores held constant?

2. Did the students of the experimental classes with above average, average, and below average intelligence quotients achieve significantly more than their counterparts in the control classes?

3. Did the students in the experimental classes evidence a significantly greater change in variance from the pre- to to the post-test than did the students in the control classes?

The results of the above study were summarized as follows:

> The data presented in this study would lead one to conclude that the film method produced somewhat greater variability in achievement than did the conventional method. Therefore, in proportion as this is true, the film method was superior. Also, it seemed to produce greater variability than the conventional method for students in the I.Q. ranges 113-124 and 113 and below. Thus, one may conclude that the film method was superior to the conventional method for those groups of students.
>
> The reactions of the teachers and the students would seem to indicate that there were too many films and that it would be a better procedure to select and show films once or twice a week. The films selected should be those for which equipment is not available and those that demonstrate principles and theories difficult to present in a typical high school classroom.
>
> The conclusions of this study must be tempered by the fact that only the classes in two large selected schools were used. However, the use of two schools similar in size, purpose, and community background would tend to minimize the effect of these variables. No attempt was made to secure a random sample of physics classes in the State of Kansas since the cost of a set of films and distribution of the films

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[13] Ibid., p. 386.

to a large number of schools would have been difficult.

The results of this study parallel quite closely the results as obtained in the Wisconsin Physics Film Evaluation Project in which 30 control and 30 experimental schools were selected at random.

The reactions of the teachers and students to using films in physics teaching in the Wisconsin project were not unlike those made by the participants in this study. It would seem from reading the results of the Wisconsin project and this study, that much is to be gained by using the films in high school physics classes. It would also seem that there are many deterrents to the use of these films. Perhaps the happy solution to the whole problem is a wise selection of films by the teacher in terms of: (1) his preparation to teach physics, (2) the equipment and facilities available, and (3) the ability of his students to master the level of physics he is able to present.[14]

The same investigators are now conducting a year-long study of the effectiveness of the Encyclopaedia Britannica Film Course on Chemistry, involving 1,000 students of chemistry in the five Wichita high schools of Wichita, Kansas. In addition to the usual achievement tests designed to measure the objectives of high school chemistry, a 50-item test on laboratory techniques and apparatus will be administered. It may be that students in the non-film classes may achieve significantly more on this test since a good portion of their class time for the year will be spent in the laboratory. The students in the film classes will have little if any experience in actual laboratory work.

Insofar as these illustrations are examples of good research studies, it is almost axiomatic to say: That good studies are essential if research is to be implemented into action.

Nicholas A. Fattu discusses the characteristics of good studies in some detail and I quote as follows:

> A good study puts us ahead of where we are now, tackles problems not handled by peers, solves problems that others have failed to solve. A good study makes a difference in educational practice if the potential applications are taken seriously. A good study is imaginative, ingenious, and productive of new approaches, new ideas, and new data. A good study fits into a pattern of long range work. It has antecedents and consequents, and the total result is increased understanding of a field as a result of the accumulation of studies.
>
> A good study is carefully designed and planned. It identifies a definite problem. All parts of the procedure are relevant to the question being studied--data collected, analysis of data. The interpretation of findings or meanings of results is directly related to the

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[14] *Ibid.*, pp. 393-394.

organization of the study and the procedures used. The results are also directly related to the conceptualization used, and may suggest new data and new concepts.

A good study is aimed at discovering truth, not at supporting a current or proposed practice. It deals with more general and universal aspects of questions that concern education. The goal is not to find a quick solution but to develop tested principles. Results of a good study can be communicated to peers working in the same area.

A good study is appropriate to the level of development of its field and to the questions asked. Education is an enormous public enterprise engaged in a form of mass production. It is impossible to operate on this scale without systematic quality control, for without quality control we don't know where we stand, and we cannot correct the weak spots. A program of quality control involves systematic and continuous collection of facts on pupils, including long term follow-up of graduates. Data would include tests but would also include data on motivation, socio-economic background, level of aspiration, emotionality, etc. Operations research tells the school about its raw material and about its output. Operations research and quality control methods could be applied to operational data.[15]

In conducting research projects, it is important that the school personnel participating in research studies are involved in the process. They must know the purposes of the study under investigation if they are to perform their role with some degree of sophistication. Furthermore, they must gain a workable understanding of the outcomes of a study if it is expected that they will implement the research findings into action.

In each of the studies referred to in the areas of biology, physics, and chemistry, the teachers involved were made part of the research team. Specific evidence is not at hand, but subsequent visits to the schools involved indicated that some psychological ownership of the research process had been acquired. May I illustrate from a paper I read before a group of school administrators and guidance workers?

Individual analysis and its techniques would not exist if all individuals were alike and grew at the same rate and in the same manner with regard to: capacity for learning, personality, interests, attitudes, and character. If this were so, our task would be an easy one. Yet many of us have proceeded in our teaching and guidance work as if all individuals were alike. In other words, we have paid lip service to the principle of individual differences but we have not possessed psychological ownership of the principle.

Psychological ownership with regard to individual differences is acquired by a staff only when it studies the phenomena of individual differences in the pupils under its guidance and tuition. *Psychological ownership* with regard to individual differences is not naturally a part of a teacher's approach to the needs of each child until she knows each child as an individual unique and different from all other individuals under her instruction.

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[15] Nicholas A. Fattu, *op. cit.*, p. 15.

For example, in the fall of 1950, the teachers in a secondary school started a survey to seek information concerning drop-outs. From the findings of this committee we prepared a report and outlined a plan for the prevention of drop-outs. The findings of this survey were typical of the findings of other surveys of this type. This survey was different from other surveys, however, in that these teachers developed *psychological ownership* by studying the problem in their own school and by developing techniques to fit their school. Administrators, supervisors, and guidance workers must, if full use is to be made of the techniques of individual analysis, develop a feeling of *psychological ownership* on the part of the staff and even the student body when the need arises. The teachers, as a result of this survey, asked themselves this question: what could the high school do to retain these youngsters in school and more adequately equip them for the life they will live?[16]

Thus it seems almost axiomatic to also say: *That school personnel must be made a real working part of the research team and acquire some psychological ownership of the research process if research is to be implemented into action.*

Psychological ownership cannot be acquired in full by active participation in the research process. Prior to or along with participation must be some solid exposure to: (1) formal instruction in the discipline or in the area where the educational research is to be conducted; (2) psychology of learning, both in the psychology of learning per se and in psychology of learning as applied to a particular academic area; and (3) methods of educational research and the applications of statistical methods to research in education.

The first of these points need not be labored upon too long. It should be obvious even to the "starry-eyed educator," that one cannot do much real educational research unless he knows his academic field well. The researcher must be well-grounded in his discipline at the undergraduate level and in addition have pursued some real graduate work in the area. Programs in teacher education must demand real academic attainment in the major or minor teaching field. Recent action at the University of Kansas resulted in four concentration programs for prospective science teachers. The one for the preparation of chemistry teachers is given below:

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[16] Kenneth E. Anderson. "General Considerations: A Frame of Reference for Research." *Music Therapy* 1952, (Published by the Allen Press, Lawrence, Kansas) p. 216.

1. General Requirements. All students selecting a science concentration should complete at least two courses each in biology, chemistry and physics. One course is strongly recommended in both astronomy and geology. A course in geography is recommended.

2. Chemistry 2, Principles of Chemistry 4-5
   Chemistry 3, An Introduction to the
   Chemistry of the Elements 4
   Chemistry 28, Quantitative Analysis 5
   Chemistry 161, Organic Chemistry 5

3. Electives in chemistry 11-12

4. A course in modern physics is recommended.

5. A minimum of 12 hours of physics is recommended.

6. A working knowledge of calculus is needed as a tool for upper division courses.

7. Electives from among the sciences so that the number of hours totals a minimum of 60.

8. Upper division courses should be taken whenever possible.

9. The four-year programs outlined above are considered minimum preparation for science teachers. Teachers are urged to complete a fifth year by pursuing the Master of Science in Education degree which permits 10-15 hours of work in science at the graduate level. Alternatively, teachers may pursue the Master of Arts degree or Master of Science degree in one of the science fields.

The second of the points listed above need not be treated at length in this discussion since previous participants such as Dr. Mark May of Yale have covered this topic in excellent fashion. Pertinent to the discussion, however, is the following statement:

Education is an integral part of modern life. Modern individual and social life encompasses a great complexity of phenomena. Systematic and orderly investigations of the "great buzzing confusion" of life require conceptualizations, that is, views of what to look for, how to look for them, and what kinds of structures, processes, and relationships are involved. If when one entered a classroom he had no prior conceptualization of teaching and learning, he would see children and an adult, he would hear several children and the adult speaking, he would note physical items in the room, movements of people, and the like. What gives it meaning for the investigator of classroom instruction is a "model" which he conceives, a simplified picture of the structure and process of classroom instruction. This model usually includes such elements as a teacher, pupils, objectives of instruction, methods of teaching, materials of instruction, learning outcomes. If he holds such a model in mind, he has a basis for focusing his observations and for arranging and analyzing his data. This development of a formal model provides a way of viewing the complex phenomena in a fashion which permits scientific study. Models serve to simplify a process which appears on the surface to be too varied or complex or haphazard to be understood. But models must not only simplify complex phenomena but they must provide a means for explaining and predicting the variations and regularities observed in the phenomena. Hence, conceptualizations change as research indicates that earlier models fail to explain or predict many of the observations noted. For example, a common model for research in instruction in the 1920's included a teacher, a group of pupils, methods of teaching, learning outcomes.

This conceptualization recognized variations in the intelligence of pupils, various methods of teaching and variations in the degree of achievement by the pupils of the learning outcomes. Since that time, a number of things have been added to this model, such as variations in the skills, preperation, and personalities of teachers, variations in the initial achievement of pupils, in the kinds of pupil motivation, in the content and intensity of pupil interests, and variations among several major kinds of educational outcomes, such as knowledge, skills, attitudes, and problem-solving. Effective educational research is commonly guided by conceptualizations which provide ways of viewing the complexity of educational phenomena in orderly and meaningful patterns.[17]

The third point listed above needs somewhat greater treatment since none of the papers presented has given the topic extensive coverage, particularly as it refers to experimental studies.

As is so often the case, a study of a particular problem in education is given a stamp of approval or is labeled respectable, because the study contains a number of tables which are statistical in nature. Actually, statistical analysis of data is only in order providing the researcher:

1. Selects the appropriate statistical technique for the data at hand and in addition tests the assumptions basic to the technique. This implies an adequate background in the field of statistics and measurement. Even the coroner conducting a post-mortem examination selects appropriate tools and techniques, but even then his examination more often than not fails to produce additions to the knowledge of medicine.

2. Applies the "Golden Rule" of statistics. This in essence means that consideration is given to statistical techniques early in

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[17] Ralph W. Tyler. "The Contribution of the Behavioral Sciences to Educational Research." First Annaul Phi Delta Kappa Symposium on Educational Research, Phi Delta Kappa, Inc., Bloomington, Indiana, pp. 57-58.

> the study, which is often a controlled experiment, before the data have been gathered. Too many studies supposedly experimental in nature are like corpses--all that one can do is hold a post-mortem examination. An experimental study should be carefully planned in advance under conditions which will afford a secure basis for new additions to knowledge.

In most investigations other than the descriptive type, the two chief problems are: (1) testing statistical hypotheses, and (2) estimating population parameters. The first involves an exact test of significance or a test which is based on a known probability distribution. Usually this involves setting up the hypothesis as a null hypothesis, applying the appropriate statistical tool, referring the final result to the appropriate model or distribution, and last of all a rejection of the null hypothesis or its acceptance (failure to reject it).

It is essential in an experiment that the principle of randomization be observed. Otherwise a test of significance has no validity. It is important that groups of students which are to be treated differently, have the same probability of being so treated. In other words, the educational treatments should be randomized. In addition, the students should be assigned at random to the various groups receiving different educational treatments. Only when samples are obtained in this manner and only when the experiment makes it possible to secure a valid estimate of the experimental errors, is statistical inference permitted.

It is important in setting forth the plans of an experiment to answer the questions which prompted the research and to list all the variables that might conceivably influence the results. In an experiment based on the assumption of controlling all factors except the one under investigation, it is often observed that results will change from one experiment to another of the same kind. If all the essential conditions are varied simultaneously rather than one at a time, one can observe the effects of the factors in a nearly natural setting. Factorial design is appropriate because the effects of the interactions of all combinations of factors under consideration are measured....The chief advantages of factorial experiments are: (1) greater efficiency, and (2) greater comprehensiveness in that effects and interactions are estimated, and (3) that the conclusions have a wider inductive basis.

It is possible to partial out in a factorial design, such as the above, the effects of pre-science information and intelligence. This would call for a factorial design involving analysis of covariance.

Consideration of designs of the factorial type before the investigation gets underway might make the research efforts more fruitful.

....the research worker in science education should: (1) use adequate and reliable statistics when the research calls for description, (2) use statistical techniques properly by testing assumptions basic to the techniques, and (3) select and use statistical tools in the early stages of an investigation. In addition, the research worker in science education should be aware of new statistical tools and sampling distributions available for exact tests of significance and think of problems in science education not only in terms of tests of significance but in terms of problems of estimation.

Finally, the science researcher should use the powerful tool of analysis of variance and covariance to bolster the controlled experiment in science education, and insofar as possible consider in future studies the possibilities of varying all the essential conditions simultaneously by designs of the factorial type so that our findings will reflect natural settings and thus have wider applicability in our science teaching. When this becomes an accomplished fact, science teaching via realistic research will improve immensely.[18]

Thus, it seems almost axiomatic to say: That if research is to be implemented into action, the persons involved in the research process must be well-grounded in their academic fields, know the psychology of learning, and be sophisticated in the application of research and statistical methods to problems in educational fields.

The aims of educational research are perhaps those of science, namely: description, explanation, and prediction. Or to put it in terms of statistics, the aims are: summarization, comparison, and inference. In a sense, these constitute levels of research. The last two are related and concern inquiry which goes beyond the level of gathering facts, important and indispensable as this process may be. This is simply to say that educational research which is concerned with simple fact-gathering has little chance of being implemented into action. As Ernest Nagel puts it:

> ....the simplicistic Baconian conception of science still seems to dominate much empirical research in this area, so that the assiduous collection of data, uninformed by a clearly formulated and consciously entertained controlling hypothesis, is often taken to be the paradigm of sound inquiry....Although no one can be explicitly aware of all the tacit assumptions one is making in the conduct of any inquiry, it is well to realize that one is always operating within some framework of presuppositions, and to be habitually on the lookout for those that are highly questionable. This point seems to me especially important in a domain, such as the study of human behavior, in which theoretical notions are frequently taken for granted that are still not firmly established. The rather prominent fluctuations of fads and fashions in educational practice, though presumably each is based on the findings of allegedly "scientific" research, provide some evidence that many of those findings are not the conclusions of a critically conducted inquiry.[19]

When one operates on the levels of explanation and inference, he must possess a sophisticated understanding of the framework within which he operates. For example, he must be aware of the assumptions underlying the application of a statistical technique and have a sound feel for the concept of error. Again, to put it in Nagel's words, I quote:

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[18] Kenneth E. Anderson. "The Statistical Approach to Problems in Science Education." Science Education, 38(December, 1954) 390-397.

[19] Ernest Nagel. "Philosophy in Educational Research." First Annual Phi Delta Kappa Symposium on Educational Research, Phi Delta Kappa, Inc., Bloomington, Indiana. p. 77.

> ....that although research techniques are often employed in this domain with undoubted mechanical expertness, those who use them do not always possess a mature understanding of their intellectual tools. For example, they are in general not sensitive to the limitations of various types of quantitative scales currently in use, and are sometimes not aware of even such fundamental points as that the relative magnitudes of numerical differences on an ordinal scale are without significance. Similarly, they apply many statistical formulas in drawing inferences from data, without much thought to the fact that while those formulas may be valid within the framework of theoretical assumptions in which the formulas are derived, these assumptions may not always be realized with a sufficient degree of approximation to warrant the inferences. Moreover, there is often only a dim conception of the nature of controlled experiment, so that general propositions are asserted on the basis of ostensibly confirmatory data that do not provide competent support for those conclusions. In any event, there is a frequent neglect of the fundamental cannon of experimental reasoning that the mere agreement of factual data with a given hypothesis does not constitute cogent evidence for the latter, if those data are also compatible with equally plausible competing hypotheses.[20]

Thus it seems almost axiomatic, *that if research is to be fruitful and transferable into action, it must be conducted insofar as possible on the upper levels of the research continuum, preferably at the level of prediction or inference.*

Poor studies are often trivial studies or often include:

> ....those that have been done so often that there is no use doing them again--correlations between ACE, high school ranks, etc., and college grades.[21]

The above is simply an appeal to those who do researh to be thoroughly familiar with the literature available regarding the problems under investigation. Undoubtedly the participants in this conference are familiar with the excellent summarization on "Television Research in the Teaching-Learning Process" by Presley D. Holmes.[22]

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[20] *Ibid.*, pp. 77-78.

[21] Nicholas A. Fattu, *op. cit.*, p. 16.

[22] Presley D. Holmes, Jr. "Television Research in the Teaching-Learning Process." Unpublished doctoral dissertation, Wayne State University, 1959, 152 pp.

But to make my point, there is little to be gained in the repetition of studies that have exhausted the problem. To do so is to hinder the implementation of research into action.

Whether or not the six points I have stressed for the implementation of research are realistic, they are in my opinion highly essential.

I have not touched on the obvious steps on how to get action. Edgar Dale[23] outlines the four basic steps in any effective communication process. They are:

1. You must get the attention of the listener, the viewer, or the reader.
2. You must prepare the materials in such a way that they are clear and precise.
3. The reader or listener or viewer must believe what you say.
4. The person communicated to must act.

Dale also gives a few suggestions for improving learning and action. They are as follows:

1. Start where people are. It is hard for a specialist who has spent years of study and years of action in a field to understand how limited a person's background can be in an area in which he is not experienced.
2. Try conversion through diversion. Let new learning hitchhike on the old. It is hard to get people to do something entirely new.
3. Be satisfied with little changes. Progress is a series of nudges--not a big jump. We must be satisfied at the outset to see a few little steps taken in the right direction.
4. Provide local examples. Schools, for example, may reject a successful innovation occurring some distance away but accept a local example.
5. The personal flavor in communication may also be an important factor in getting action. Thus in "Mass Persuasion," the study by Robert K. Merton of the Kate Smith broadcast on bond selling during World II, we see the role of "person to person" communication.

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[23] Edgar Dale. "How Do you Get Action?" The News Letter, 25(January, 1960) No. 4. (Published by the Bureau of Educational Research and Service, Ohio State University, Columbus, Ohio)

6. Team effort is an important way of getting action. Motivation may thus be tightened and explanations made clearer.

7. Don't expect too much too soon. Thoreau, when asked about the hereafter, is quoted as saying, "One world at a time." Important educational ideas may take twenty-five years to get full acceptance, and often do.

Perhaps of more importance to the problem of implementing research into action, is an all-out commitment to the worth of the research process. Perhaps the following is pertinent as a conclusion to my remarks:

Research can serve education in the same way that it serves such fields as medicine and agriculture. It can test the effectiveness of new programs; it can establish principles which will suggest new procedures. Changes are being proposed and made in our educational programs because of the current concern that all citizens shall achieve their full educational potentials. We would be delinquent in our duty if, at the same time, we did not strengthen and extend the program of evaluation whereby we might know whether the new programs are producing their intended results.

Research is needed today to resolve the heated, and often bitter, controversies regarding educational policies and methods. Many of these differences in views stem from a lack of basic knowledge regarding learning and learners. Only when we know what various educational programs produce, and when these results are attested by objective scientific evidence, can we settle upon the better programs.

It is not enough to urge classroom teachers to put more effort into teaching subjects by traditional methods. Many current methods are the product of years of traditional practice and they are not necessarily "the most effective" in terms of current needs and knowledge. Over a period of years research has shown repeatedly that traditional methods are often based in part upon false principles of learning and that new methods can be divised to replace them.

We need research not only on educational methods, but we need a great deal of research upon the problems of motivation; we need to know far more about aptitudes and their development; we need to know more about the social forces which encourage or discourage youth from staying in school or entering a learned profession. Research has already provided insights and techniques for making better use of our human resources, but we shall remain comparatively ineffective until we know far more than we do now.

Research on educational problems and on problems significantly related to education is increasing in amount and in coverage. Funds from the federal government, foundations, and institutions have steadily increased. But, in relation to the need for improving education and to the importance of educational efficiency, the present investment in educational research is totally inadequate.

Organizations of professional educators and groups of specialists are independently promoting many kinds of research. The results are often fragmentary. Too little opportunity exists for the ablest research leaders to pool their thinking in formulating research studies in education. Creative investigators from many fields need to focus their interests and capabilities on education. The interdisciplinary approach must be encouraged if educational research is to extend its full values to the profession of teaching.[24]

Dr. Robert de Kieffer:

There are three things which Dr. Anderson said which tie directly to our next task, that of state group meetings. First, what are we trying to decide? Second, what steps are necessary for us to take within each state in developing an effective research program which will make a difference? Third, how can we evaluate what we have done here?

Using these three points in our deliberation, we must ask ourselves: Was the experience of the last three days fruitful? Did we receive from this seminar the type of stimulation and information we came for? If we did, what are we going to do with the results?

FINAL REPORTS BY STATES--Wednesday, April 13

Dr. Robert de Kieffer:

We now come to the most interesting part of the seminar. For the past three days, we have had action, interaction and reaction. Although the fruits of our labor may not be apparent at this session, we will at least be in a position to estimate our effectiveness in the future by listening to the reports from the various states concerning ways in which they will attempt to implement this seminar into action when they return home.

Arizona:

The Arizona delegation contemplates writing a series of articles about the newer media to be included in our state teachers magazine. We hope that it will be possible to develop a mobile unit completely equipped with various media of communications to be used in workshops held in various parts of the state. We also intend to make intensive use of our two educational TV channels in disseminating more information about the newer media to the people of the state. We are contemplating the possible development of an audio-visual course to be telecast for credit over these stations. Presentations must be made to the various service clubs in the state and it is contemplated that a production center might be established at one of the institutions of higher learning to prepare materials to be used in these presentations. We feel that it is important to get to our legislature and request sufficient funds with which the schools can develop more effective media programs. Further we must encourage our colleges to conduct research in the field of newer media. Finally, we hope to keep in touch with the other groups gathered here to continue the exchange of ideas.

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[24] Kenneth E. Anderson. "A Report from the American Educational Research Association President." AERA Newsletter, 10 (October, 1959) pp. 1 and 3.

Colorado:

Our group took two different approaches to this problem. One: What the U.S. Office of Education might do in the future. Two: What we should do in the State of Colorado.

The U.S. Office of Education should become more aware of the operational research that is taking place in many local areas within the states. It should use its dissemination power to spread information about this type of research to other groups. It should further attempt to keep everyone informed about programs which are underway.

The State of Colorado plans to do more cooperative work with reference to educational research. We believe that a state group can be organized to assist with planning, conducting, financing, evaluating and designing research projects. It is hoped that such a cooperative group may be established in the near future.

Idaho: (already convened)

Kansas:

We have already planned a meeting of our delegation for Friday, May 13. The purpose of this meeting will be to explore ways and means of implementing this seminar. It is our current feeling that we must establish an inservice program for teachers in the use of newer media of communications.

Montana:

The efforts of our delegation will be directed toward the formulation of a plan to develop cooperation with the classroom teachers concerning acceptance of the newer media of education. We also are contemplating a mobile unit similar to a bookmobile for use throughout the state. This mobile unit (Media Mobile) will be used to demonstrate the use of materials and equipment to teachers in the state. Obviously, such a mobile unit will also incorporate television. Finally, we expect to publish a series of articles on the subject of newer media and research in our various state periodicals.

Nebraska:

Our delegation has made two observations. One: To the best of our knowledge, this is the first time in American education where the Federal Government has taken a lead in bringing together a group of educators for the express purpose of discussing educational problems. Two: The catalysts through their presentations are indications to us that the educational profession is maturing. As a result of this seminar, we intend to write a series of articles and papers. We further plan to convene again with the express purpose of designing a plan of action.

New Mexico:

We intend to make a concerted effort to procure a full-time audio-visual person in the state department of education. We need to increase the use of materials we currently have. We also plan to write a series of articles for our teacher's magazines. In addition, we plan to have two workshops on the New Mexico University campus, where our delegation will work as a team. We also hope to have a research specialist at the head of our research program. Finally, we feel we should be concerned with the improvement of classroom teaching and will endeavor to encourage the use of television for educational purposes, and encourage the development of research in the field of newer media in education.

Oklahoma:

We have no definite program to outline here, however, we plan to go home and get together immediately following this seminar. There is currently being held in Norman, Oklahoma, a Title VII Dissemination Conference in cooperation with three of our sister states to the south. Upon our return we plan to get together with the planning committee of the other conference and work out future plans of action.

South Dakota:

Our delegation is convinced that the information that we gathered here must be funneled down in some way to the people of our state. We contemplate doing this in the following ways:

1. Hold a series of discussions at the school boards meeting in September.

2. Prepare articles for the SDA Journal.

3. Request our teacher training institutions to discuss this problem among themselves.

4. Provide discussion for our classroom teachers through their organizations for our state workshop next year.

Texas:

Our group is going home and will have a meeting on May 3, with the people from Norman, Oklahoma. We will then start our action program which will be state-wide. This program will be publicised in our educational periodicals in the state. Our biggest problem will be that of filtering down to the classroom teachers the essence of what has happened here in Boulder.

Utah:

The Utah delegation contemplated developing a plan by which we can work through the various agencies already existing in this state. We will attempt to convey to them the importance of the newer media field. We expect to involve all of the organizations in the state by developing an awareness of research that has been, is being, or might be done in the future. In addition, we contemplate holding a series of demonstrations of the newer media communications. We want to organize these demonstrations in such a way that they will indicate not only their operation and utilization, but bring in at that time the research that has proven their value. We plan to make some of these demonstrations and presentations through the medium of TV. We also hope to be involved in some of the local teacher institutes where this subject can be discussed. Finally, we plan to gain support of the school administrators in acceptance of the problems presented at this seminar, and have discussions concerning ways by which education in the state of Utah might be improved through the effective utilization of the newer media.

Wyoming:

Our delegation is going home and hold a series of meetings to determine the best method of approaching this problem in our state. We know many of the problems to be faced concerning leadership, workshops, conferences and research needs, but it is going to take us a little time to develop a state-wide attack on these problems.

Dr. de Kieffer:

None of us can assay the values which we have derived at this seminar. I am sure, however, that what transpires within the various states in the next few years will be moot testimony of the power of common purpose and the friction of minds.

The meeting is adjourned.